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# Values and preventive health behavior: Assessment using the Rokeach Value Survey, response time, and certainty ratings

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Rokeach value survey, response time, and certainty ratings**

Blodgett, Robert Wayne, Ph.D.

University of New Hampshire, 1991

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VALUES AND PREVENTIVE HEALTH BEHAVIOR:  
ASSESSMENT USING THE ROKEACH VALUE SURVEY,  
RESPONSE TIME, AND CERTAINTY RATINGS

by

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DISSERTATION

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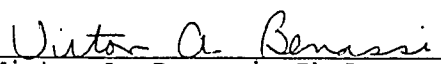
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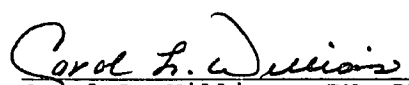
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ABSTRACT

VALUES AND PREVENTIVE HEALTH BEHAVIOR:  
ASSESSMENT USING THE ROKEACH VALUE SURVEY,  
RESPONSE TIMES, AND CERTAINTY RATINGS

by

Robert W. Blodgett  
University of New Hampshire, December, 1991

The relation between the value college students place on health and their self-reported preventive health behavior was examined within the context of Rokeach's (1973) value system. Two broad categories of values having opposite relations with preventive health behavior were identified. Of particular interest was whether decision times and degrees of certainty regarding the importance of health, relative to other values, would facilitate the prediction of preventive health behavior scores. Knowledge of ordinal distance from health enhanced prediction, but only for certain values. Composite scores incorporating response times and certainty ratings with ordinal distance from health, however, did not improve predictions of preventive health behavior. Large amounts of variability in response times and a ceiling effect in certainty ratings may have reduced their validity.

## CHAPTER ONE

### Values and Preventive Health Behavior: Assessment Using the Rokeach Value Survey, Response Times, and Certainty Ratings

Knowledge of individuals' behavioral preferences with regard to health issues has been shown to be informative about the likelihood that they will engage in preventive health behavior (Kaplan & Cowles, 1978; Lau, Hartman, & Ware, 1986; Wallston, Maides & Wallston, 1976). When individuals freely choose to engage in health promoting behavior instead of some other behavior, we may infer that the value they place on health is stronger than the value they place on other categories of behavior. However, an individual may report that health is very important and yet not freely engage in health promoting behavior. In this case we may infer that the value of some other category of behavior is competing with, or is of a similar importance to, the value of health.

The late Milton Rokeach believed that health was of such importance to the general population that it would not be useful for discriminating among systems of values (Rokeach, 1973). Consequently, the Rokeach (1973) Value Survey did not contain an item representing health value; however, a subsequent revision of the survey (Form G) includes an item for assessing the importance of health (Schwartz & Bilsky, 1987). It appears that health as a

value is gaining status among researchers (Becker & Maiman, 1975; Kristiansen, 1985c; Lau et al., 1986; Wallston & Wallston, 1980).

The purpose of the present study was to examine methodological, practical, and theoretical issues in the measurement of health value. The methodological issues pertained to a) the relation between hierarchies of values produced by different procedures, the conventional ranking procedure and a computerized forced-choice procedure, and b) the relation between response times and certainty ratings associated with judgments about the importance of health relative to other values. The practical issue involved whether specified clusters or dimensions of values found to be associated with preventive health behavior for middle-aged Britons and Canadians (Kristiansen, 1985c) would show similar associations with preventive health behavior for American college students. The theoretical issues concerned a) the efficacy of using ordinal judgments regarding the relative importance of health combined with decision times and certainty ratings associated with those judgments to predict preventive health behavior, and b) a determination of which values had the strongest influence on the relation between health and preventive health behavior.

The idea that values provide information about the likelihood that individuals will engage in health-related behavior gained prominence in the 1950s and 1960s. It was during this period that the Health Belief Model

(Rosenstock, 1960, 1966) was developed through research guided by field theory (cf. Lewin, 1951). Behavior was conceived as a function of the totality of interacting events (forces) in an individual's internal and external life space. Behavior occurred as a result of the forces that either drove or restrained the individual. These driving (approach) and restraining (avoidance) forces were considered amenable to investigation. It was believed that such investigations would enhance the prediction of future behavior from knowledge of the conflicting valences associated with events in an individual's life space. The occurrence of disease was associated with a negative valence promoting a state of discomfort and motivating the individual to resolve the state of discomfort. The idea that positive and negative valences influenced behavior had important implications for the study of health value. A more recent version of the Health Belief Model (Becker, Drachman & Kirscht, 1972, 1974; Becker, Maiman, Kirscht, Haefner & Drachman, 1977) has incorporated a component that directly addresses health value.

A second line of research that has heavily influenced the study of health values arose from the development of the Health Locus of Control Scale (Wallston, Wallston, Kaplan & Maides, 1976) and the Multidimensional Health Locus of Control Scale (Wallston, Wallston & DeVellis, 1978). It was hypothesized that locus of control only predicts health behavior when people both perceived that



their behavior influenced their health and when healthiness was valued higher than other competing and preferred modes of conduct (instrumental values) or end-states of personal striving (terminal values). According to locus of control theory, individuals are more likely to engage in a particular behavior when they believe that behavior influences outcomes and when the outcome has reinforcement value.

In neither the Health Belief Model nor Health Locus of Control research has health value been shown to be a strong independent predictor of health behavior (Lau et al., 1986). As discussed by Lau et al., the health value dimension of the Health Belief model is seldom examined by researchers. When it is examined, it is used to classify individuals as high or low in health value and virtually never as a predictor variable itself; therefore, the Health Belief Model is largely uninformative about the nature of health value as it relates to preventive health behavior. Health value has received more attention by researchers of health locus of control than by researchers of the health belief model. High health value has been shown to differentiate people more likely to engage in health promoting behavior from those less likely to do so (Kaplan & Cowles, 1978; Lau, et al., 1986; Wallston, Maides & Wallston, 1976), but the effect appears to depend upon the perception of having control over health outcomes (Abella & Heslin, 1984).

Although the concept of health value is slowly gaining

status among researchers, it remains underutilized in health research (Lau et al., 1986). Three factors appear to affect underutilization: a) the mistaken assumption that health has universally high importance (Lau et al., 1986; Kristiansen, 1985; Lowery, 1981), b) the difficulty inherent in arriving at an accepted definition of health value, and c) the absence of a widely accepted method for measuring health value (Lau et al., 1986). Each of these factors will be considered in turn.

Universal importance of health. When the universality notion is examined from a theoretical perspective, research evidence demonstrates that approximately one half of the college students sampled did not meet the measurement criteria for classifying them as high in health value (Abella & Heslin, 1984; Lau et al., 1986; Wallston, Wallston, Kaplan & Maides, 1976). It has been suggested by Lau et al. that the only time health value could be expected to be universally high is when people are stricken with illness. However, an examination of research on diabetes in which health value was used as a classification variable did not confirm this hypothesis. Although the percentage of persons classified as low on health value dropped markedly from that of college students, there remained between 9% and 25% of the diabetics classified in that category (Ferraro, Price, Desmond & Roberts, 1987; Ruzicki, 1984; Schlenk & Hart, 1984).

Health is not universally important within the general

population because approximately 50% of patients fail to comply with prescribed medical treatment (Sackett, 1976). The Health Belief Model, of course, addresses many other factors that can be cited as explanations for noncompliance, such as belief in the inefficacy of treatment, low perceptions of severity and vulnerability to illness, low perceived threat, nonsupportive social relationships, or financial burdens associated with maintaining treatment (Maiman & Becker, 1974). The presence of alternative explanations, however, does not exclude health value as a factor, particularly when very little is known about the relation between health value and these other factors. It is unfortunate that research evidence on the role of health value is so sparse.

Lack of an accepted definition for health value. The second factor affecting underutilization, the lack of an accepted definition of health value, arises from the larger problem of arriving at an accepted definition of values in general (Peterson, 1976; Rokeach, 1973; Schwartz & Bilsky 1987). Rokeach (1973) defines value as "an enduring belief that a specific mode of conduct [instrumental value] or end-state of existence [terminal value] is personally or socially preferable to an opposite or converse mode of conduct or end state of existence" (p. 5). Schwartz and Bilsky (1987) proposed a similar definition derived from five common features underlying the majority of definitions found in the literature on human values. "...values are (a) concepts or beliefs, (b) about desirable end states or

behaviors, (c) that transcend specific situations, (d) guide selection or evaluation of behavior and events, and (e) are organized by relative importance" (p. 551).

It seems unlikely that the properties of health value would be different from any other human value. The values an individual holds are not independent of one another (Rokeach, 1968, 1973; Schwartz & Bilsky, 1987); therefore values must be understood in the context of an interacting value system or set of beliefs that transcends specific situations and serves as a standard for guiding behavior (Rokeach, 1973).

A majority of researchers seem to ignore the idea that health value must be understood in the context of a value system because the relation between health value and other values is rarely mentioned. An exception can be seen in recent work by Kristiansen (1985a, 1985b, 1985c, 1986) who examined the relation between health value and both the terminal and instrumental values included on the Rokeach Value Survey. This work will be discussed later.

Lack of a widely accepted measure of health value. The third factor, the lack of a widely accepted measure of health value, is addressed at length by Lau et al. (1986) along with a description of some of the commonly used measures of health value. That discussion will not be repeated here other than to note that the measures encompass both cognitive and behavioral domains of health value. The ensuing discussion will focus instead upon the

most widely used measure of health value, the terminal value portion of the Rokeach Value Survey, and upon the need for expanding our knowledge about the processes by which people make value judgments about health. (Note that terminal values are those values that an individual will seek to maximize as an endstate of his or her personal strivings, such as happiness, salvation, comfort, and the like. Instrumental values are those values that reflect an individual's preferred modes for conducting his or her affairs, such as ambition, self-discipline, etc., so as to maximize his or her terminal values.) The sparsity of knowledge concerning the convergence between the various techniques for assessing health value compromises our understanding of this phenomenon. It is, therefore, the measurement of health value with particular emphasis on the health-modified Rokeach Value Survey that constitutes the primary focus of the present research.

#### Methodological Issues

The majority of researchers who have used the Rokeach Value Survey modified the conventional instrument by shortening it from 18 to 9 items to which health was then added as a tenth item (Abella & Heslin, 1984; Kaplan & Cowles, 1978; Laffery & Isenberg, 1983; Wallston, Maides & Wallston, 1976; Wallston, Wallston, Kaplan & Maides, 1976). Researchers have often failed to specify the criteria used when selecting the 9 values that form the context for health value, or report having used an arbitrary selection procedure (Kristiansen, 1985c; Wallston & Wallston, 1981).

The implicit assumption underlying arbitrary selection of the value context is that the value context does not influence the rank that is assigned to health value.

The subject's task in completing the Value Survey is to rank the terminal values in an order that represents his or her personal hierarchy of importance. Potentially important problems arise as a consequence of shortening the survey. Individual values take on meaning only in relation to other values (Rokeach, 1973; Schwartz & Bilsky, 1987). By reducing the number of items, researchers risk losing important information about the relative position of health value in the value hierarchy. This problem is evidenced most clearly by the fact that certain values tend to cluster in the upper third of the hierarchy, other values in the middle third, and still others in the lower third of the hierarchy. Health is one of the values that tends to fall in the upper third of the survey. If the context in which health value is presented happens to be values that tend to be clustered in the lower or middle thirds of the survey, then the rank position of health will be artificially inflated by the context effect.

Miller's (1956) observation that processing in working memory is limited to 5 to 9 pieces of information is potentially a justification for reducing the number of items on the survey. That is, if people can only process 5 to 9 pieces of information simultaneously in working memory, how would it be possible for them to process 18

pieces of information at the same time as is required by the Rokeach Value Survey? Rokeach (1973) argued, however, that the nature of the ranking task did not constitute a serious violation of the '7 plus or minus 2 rule' because the number of items to be simultaneously examined steadily decreased as the position of each preceding item was established in the hierarchy. The present research will address the problem of working memory saturation by presenting items from the Rokeach Value Survey in pairs as well as in the conventional ranking task format (18-items plus health as a 19th value).

A second measurement issue involves whether different measurement techniques produce different orderings of values. Feather (1973) addressed this question by comparing three measurement procedures: a) the conventional ranking procedure in which a rank from 1 to 18, corresponding to ordinal importance, is assigned to each value, b) a Likert format 8-point rating scale, and c) a paired-comparison task in which each of the 18 terminal values was paired with every other terminal value and each of the 18 instrumental values was paired with every other instrumental value. The results demonstrated that positions of relative importance were virtually unaffected by type of measurement procedure. A related investigation conducted by Rokeach (1973) compared a semantic differential procedure with the conventional ranking procedure and found that the relative positions of importance assigned to values were unaffected. Recall that

the conventional versions of the Rokeach Value Survey, prior to revision, did not include an item for measuring health value; therefore, Feather's and Rokeach's studies do not specifically address the issue of whether health value is affected by measurement procedure. It seems reasonable to assume that health value would not be different from other values.

Related to the issue of measurement technique is the question of whether different research instruments assess similar degrees of importance for health value. Because researchers do not typically employ more than one type of research instrument in a particular study, one can only address this question through researchers who employed health-modified versions of the Rokeach Value Survey to validate other measures of health value. Only one such study (Lau et al. (1986) was discovered. Lau et al. developed a four-item, Likert format, health value scale similar in design to that used by Seeman and Seeman (1983). Their results show modest but significant correlations between ratings of importance for three of the four items and the rank assigned to health value. Lau et al. argued that their scale is easier to administer than the modified version of the Rokeach Value Survey making it more suitable for research. The disadvantage of such measures is that they isolate health value from the context of a person's value system. A fundamental assumption in the present study is that health value is best understood when examined



in the context of competing values. To date, there is not enough research on the relation between modified versions of the Rokeach Value Survey and other measures of health value to make meaningful comparisons.

The several instruments that have been employed to measure health value (Lau et al. 1986) demonstrate a relation between health value and the likelihood that individuals will engage in preventive health behavior (broadly defined here as ranging from seeking health-related information to actively complying with a health regimen) (Abella & Heslin, 1984; Kaplan & Cowles, 1978; Kristiansen, 1985a, 1985b, 1985c, 1986; Lau et al, 1986; Seeman & Seeman, 1983; Wallston, Maides & Wallston, 1976). An exception is one study (Laffery & Isenberg, 1983) that did not show the relation. The variety of health value instruments, together with their common relation to several aspects of preventive health behavior, suggests that a more rigorous examination of health value within the framework of social cognition might provide additional insight into that relation. Prior to discussing the actual measurement procedures involved in such a study, it will be useful to present the theoretical framework underlying the measurement techniques.

#### Theoretical Issues

For the purposes of the present study, it would be useful to demonstrate a similarity between values as cognitive structures and other more widely researched cognitive structures, such as schemas (Markus, 1977) and

attitudes (Regan & Fazio, 1977). Recall the definition offered by Schwartz and Bilsky (1987), "...values are (a) concepts or beliefs, (b) about desirable end states or behaviors, (c) that transcend specific situations, (d) guide selection or evaluation of behavior and events, and (e) are organized by relative importance" (p. 551). The cognitive implications of Schwartz and Bilsky's definition are augmented by reviewing the extensive treatment of the nature of values presented by Rokeach (1973). Rokeach conceptualized values as prescriptive or proscriptive beliefs about individual needs or societal demands, having a three-part (cognitive, affective, and behavioral) structure, that guide behavior by establishing a preference for action. Values central in importance within an individual's value system were described as imperatives for guiding actions, for the development of attitudes, for the justification of both actions and attitudes toward self and others, for making judgments of morality, and for making comparisons between self and others (Rokeach, 1968).

As cognitive representations of individual needs and societal demands, values are likely to have properties similar to those ascribed to other cognitive phenomena such as interests (Allport, Vernon, & Lindzey, 1960), attitudes (Regan & Fazio, 1977), and schemas (Markus, 1977). One function of these cognitive phenomena is to reduce the amount of information processing required for adaptive functioning in one's environment (McGuire, 1969). Values

organize experience and categorize objects and events along a dimension of goodness, preference, or desirability, dimensions that are associated with affective reactions. Values, therefore, should to obey principles similar to those demonstrated for other cognitive phenomena.

The idea that individuals have value schemas was suggested by Allport (1955)

The healthy adult ... develops under the influence of value schemata whose fulfillment he[she] regards as desirable even though it may never be completely attained. In agreement with such schemata he[she] selects his[her] perceptions, consults his[her] conscience, inhibits irrelevant or contrary lines of conduct, drops and forms subsystems of habits according as they are dissonant or harmonious with his[her] commitments. In short, in proportion as active schemata for conduct develop they exert dynamic influence upon specific choices (p. 75-76).

Members of a culture internalize ideals and modes of conduct characteristic to that culture (i.e., democracy, freedom, etc.) which in turn become value schema guiding individuals' perceptions, judgments, and behavior. It is, however, unlikely that value schemas are associated with the same degree of schema-behavior consistency as is ascribed to self-schemas. A primary difference between self-schemas and value-schemas is the stronger influence of temporary internal impulses and environmental demands on value schemas than on self-schemas.

Two areas of research in social psychology provide a framework that helps to understand how values may influence the selection and organization of information and how values may influence the selection of behavioral responses: self-schema theory (Markus, 1977) and attitude-behavior consistency (Regan & Fazio, 1977).

Self-schema theory (Markus, 1977) proposes that cognitive structures about the self are formed through an individual's attempts to explain enduring patterns in his or her behavior, as well as other people's reactions to his or her behavior within particular domains of experience (Markus, 1977; Mills, 1983). Once internalized, self-schemas influence what sort of information about self is attended to and the manner with which that information is organized and processed.

Much of the research on attitude-behavior consistency conducted by Fazio and colleagues has focused on identifying factors that affect the strength of attitudes, and attitude-behavior consistency. More specifically, Fazio and colleagues investigated the strength of the association between an attitude object and the evaluation of that object and the effect that strength of association has on accessibility of attitudes from memory. Accessibility for memory was operationally defined as latency of response to inquiries about attitudes.

Although research of the type described above has not been applied to the study of values, the similarity in

function that is ascribed to attitudes, schemas, and values (i.e., the organization and categorization of information for the facilitation of cognitive processing) suggests that values should follow many of the same principles that affect other cognitive phenomena. Sherman and Fazio (1983) presented a convincing argument that the parallels between attitudes and traits are sufficiently close that many of the variables that moderate the relation between attitudes and behavior also moderate the relation between traits and behavior. They observed, however, that the scarcity of research on variables that moderate the trait-behavior relation compromises the generalization from attitudes to traits.

A value that is important to an individual will facilitate the organization of perception, memory, attitudes, and expectations for future behavior. Values that are highly important should be associated with greater value-behavior consistency, and should be more accessible from memory upon inquiry. It follows that people should more readily respond (shorter response times) to values as being self-descriptive when the values are important to them, and when they are certain the polar opposite is not true. It is unlikely, given the socially desirable nature of the Rokeach values, that individuals would not perceive them as self-descriptive to some degree.

#### Summary and Refinement of the Problem

Research employing the Rokeach Value Survey (Rokeach, 1973) to measure the importance of health as a value has

largely ignored the relation between health and the other values in the survey, particularly as they relate to preventive health behavior. The failure to examine health value within the context of other values violates one of the primary assumptions underlying the theory of human values, namely that a given value is best understood and becomes meaningful as a predictor of behavior only when it is examined as a component of a larger value system (Kristiansen, 1986; Rokeach, 1973). If we are willing to assume that Rokeach (1973) successfully identified 18 distinct values that are important in American culture, the issue of which values are deleted is not trivial, and the value context within which health is presented becomes crucial to the measurement of health value.

In the present study, health was placed in the context of values that were most frequently ranked in the upper third of the survey by a similar sample of college students. There were two reasons for using only six values as the context in which health was presented. First, there was concern that subjects would experience fatigue on the forced-choice computer task if all possible pairings of values were used. Second, it was believed that this procedure would provide the most rigorous test for the importance of health relative to other values.

Research by Kristiansen and Others. Kristiansen (1986, 1985a, 1985b, 1985c) is one of the few researchers to examine the value of health within the context of the

entire Rokeach Value Survey and to examine the relation between health and other values as they relate to preventive health behavior. Her work has focused primarily on conventional rankings of health value and the other 18 Rokeach values. The information not provided by this type of investigation concerns the degree of difficulty associated with deciding whether health is more important or less important than another value? The decision to assign values to adjacent ranks might be relatively easy for one pair of values and yet very difficult for a different pair of values.

A second shortcoming of conventional ranking procedures is the unsuitability of the data for the application of parametric statistical tests. One solution to this problem is to convert the ranks to an interval level of measurement by performing a numeric transformation. One such transformation, the normalized ranks transformation (Kenny, 1987), involves the conversion of ranks to proportions followed by the conversion of the proportions to z-scores. Thus the normal curve is partitioned into 19 equal areas. The distance between values becomes a uniform interval equivalent to 1/19th of the area under the normal curve. This transformation has been routinely employed (Feather, 1973, 1975; Kristiansen, 1984a, 1985a, 1985b, 1985c, 1986; Kristiansen & Eiser, 1986) to convert conventional value ranks to an approximation of the interval level of measurement assumed under the use of parametric correlations.

It is not clear that, in the case of value measurement, the transformation offers any real interpretive advantage because the statistical tests must be interpreted with the realization that the original data were ranks. Furthermore, in order to justify the use of parametric statistical tests it must be assumed that the psychological processes underlying the generation of the data (subjects' responses to the value survey) conform to the properties of a normal distribution. Transformation, therefore, may not be justified in terms of accurately reflecting the relation between the state of affairs in the empirical world (the psychological processes underlying the generation of the data) and the numerical representation (scale of measurement) of that empirical world (see Stine, 1989a, 1989b for a discussion of admissible data transformations). It is recommended that in the absence of compelling evidence to justify an ordinal to interval data transformation, that statistical techniques appropriate to the scale of measurement (nominal, ordinal, etc.) that produced the data be used (Stine, 1989a).

In order to promote continuity between Kristiansen's research and the present study, analyses employing transformed ranks were conducted. Although evidence suggests that Pearson's  $r$  is robust even to extreme violations of the interval assumption (Havlicek & Peterson, 1977), such data transformations should be used with care. Furthermore, the advantage of parametric statistical



analyses afforded by such transformations have been shown to contribute very little to the explained variance in the criterion variable compared to the less powerful nonparametric statistics (John Mayer, personal communication, October 4, 1989).

A second, and perhaps more desirable solution was discussed by Schwartz and Bilsky (1987) and rests on the assumption that subjects can accurately report their degree of confidence that a given value is more important to them than an adjacent, lower ranked value. Subjects' confidence estimates were used (Schwartz & Bilsky, 1987) to construct an interval between pairs of values with lower confidence ratings producing narrow intervals and higher confidence ratings producing wider intervals. The implication for measuring the relative importance of values is that smaller intervals of confidence are indicative of difficulty in deciding which member of a pair of values is more important; hence a greater degree of similarity in importance between the values. Larger confidence ratings indicate that the decision is relatively easy (i.e., that importance was dissimilar).

Schwartz and Bilsky constructed interval data by assigning 1 to the highest ranked value and then adding each successive confidence rating to the next rank position, resulting in an approximation of an interval scale of relative importance. A confidence scale whose possible numerical values range from 0 to 100 would produce intervals of confidence ranging from 1 (highest ranked

value statement) to 19 (lowest ranked value statement) when a subject's confidence ratings equal 0, to intervals of confidence ranging from 1 (highest ranked value statement) to 1800 (lowest ranked value statement) when a subject's confidence ratings equal 100.

For the ratings employed in the present research, the word "confidence" was replaced by the word "certainty". The word "certainty" connotes an absence of doubt as to the truth of something, whereas the word "confidence" connotes the absence of diffidence or embarrassment. It is the absence of doubt as to the relative importance of health that is of interest, not a lack of self-confidence or embarrassment. Certainty ratings served as convergent evidence for similarity in value importance as measured by response times. It was assumed that high levels of self-reported certainty and short response times (short decision times) would be associated with dissimilarity in importance between values, and vice versa.

More recent research by Kristiansen and colleagues (Kristiansen & Zanna, 1988; Kristiansen & Matheson, 1989) examined the hypothesis that the degree of difficulty associated with assigning two or more values to ranks is related not only to the relative importance of the values but also to the complexity of the reasoning involved in the resolution of that conflict. Kristiansen and Zanna's line of reasoning emerged from the value pluralism model proposed by Tetlock (1988). This model was developed for

the specific purpose of evaluating political ideologies, but it also provides a framework for investigating values in the context of other ideologies, such as ideologies regarding health. According to the value pluralism model, core or terminal values underly a person's ideologies and specify what the ultimate goal(s) of a particular ideological position should be. However, it is not always the case that the values that underly a particular ideology are in agreement. In some cases an ideology may be based on values that frequently compete with one another. For example, placing a high value on a life style that maximizes thrill-seeking, worldly comforts, or a highly involved social life would no doubt compete with valuing a life style that maximized preventive health behavior. When values differing dramatically in importance come into competition and when the reasoning about the competition is simple, people should be able to choose one course of action over another relatively quickly.

Two different types of cognitive decision strategy are hypothesized to occur depending upon the complexity of the reasoning processes and the relative importance of the values. It is assumed under the model, all things being equal, that individuals will use the least complicated decision strategy (i.e., the decision strategy that requires the least cognitive effort). When values underlying an ideology are compatible with each other, or when there is a large disparity in the importance of two values, the decision strategy involves emphasizing the more

important value and de-emphasizing the value of lesser importance, hence a fast decision. However, when the values underlying the ideology are incompatible and are very similar in importance, a slower decision process becomes necessary. The latter decision strategy would very likely be associated with greater uncertainty, hence, longer decision times than the former strategy (Thompson & Dunn, 1963). The ability to obtain this type of information with regard to the organization of values as measured by the Rokeach Value Survey would be an important advance in knowledge concerning the relation between the value of health and preventive health behavior as mediated by health value's relative importance to other values.

#### The Present Study

This study examined two methodological issues in the measurement of health value: a) the relation between the conventional rankings and computerized forced-choice rankings, and b) the relation between response times and certainty ratings obtained within the context of forced-choice decisions regarding the relative importance of health compared to other values.

The first methodological issue was addressed by correlating conventional rankings with computerized forced-choice rankings expressed in terms of a proportion for each of the Rokeach values. A proportion represented the number of times a given value was chosen instead of health relative to the total number of times (i.e., the number of

subjects) it was paired with health. Conventional rankings were expressed in terms of median ranks for each of the values. It was hypothesized that the two ordinal measures of values would be strongly correlated, indicating that they generate very similar value hierarchies.

The second methodological issue was addressed by correlating response times with certainty ratings both on a subject by subject basis (i.e., idiographically) and across subjects (i.e., nomothetically). It was hypothesized that response times and certainty ratings would be inversely correlated, indicating that decisions regarding the relative importance of health that were associated with long response times were also associated with low levels of certainty.

The practical contribution of the study was an investigation of whether Kristiansen's (1985c) four value dimensions, obtained on a sample of middle-aged Britons and Canadians, and the relation of those dimensions to preventive health behavior would be replicated among American college students. The four bipolar dimensions (in quotations) and the values (in parentheses) comprising them were: 1) "Noble" (Equality, A World at Peace, Inner Harmony, A World of Beauty) versus "Hedonistic" (Happiness, Pleasure, A Comfortable Life), 2) "Personal" (Wisdom, A Sense of Accomplishment, Self-Respect) versus "Societal" (Freedom, National Security, A World at Peace), 3) "Satisfaction" (Mature Love, An Exciting Life, True Friendship) versus "Safety" (Family Security, National

Security, Health), and 4) "Extraversion" (Social Recognition, An Exciting Life) versus "Introversion" (Salvation, Inner Harmony, Health). In accordance with Kristiansen (1985c), it was hypothesized that as the importance of the values comprising the Hedonistic pole, the Satisfaction pole, and the Extraversion pole increased, self-reports of preventive health behavior would decrease, and that as the importance of the values comprising the Noble pole, the Safety pole, and the Introversion pole increased, self-reports of preventive health behavior would also increase.

From a theoretical standpoint, the study extended Kristiansen's work in two areas. It investigated the validity of measures of relative importance (i.e., rank differences, response times, and certainty ratings) as predictors of Preventive Health Behavior Scale scores. It was hypothesized that composite measures of relative importance (i.e., rank difference scores X response times, or rank difference scores X certainty ratings) would predict greater amounts of variance in self-reported preventive health behavior than conventional ranks, normalized ranks, or rank difference scores alone. The present study also provided information about the particular values that competed most directly with health in relation to self-reports of preventive health behavior. This aspect of the study was exploratory, and hence, no specific predictions were made.

A final purpose of the present study was to examine whether health value predicts greater amounts of variance in self-reported preventive health behavior than selected demographic variables.

#### Summary of Hypotheses and Exploratory Questions

Hypothesis 1: Conventional ranks and forced-choice ranks would be strongly and positively correlated.

Hypothesis 2: Response times and certainty ratings would be inversely correlated, indicating that long response times were associated with low levels of certainty.

Hypothesis 3: As the importance of the values comprising the Noble, Safety, and Introversion poles increased, self-reported preventive health behavior scores would also increase. As the importance of values comprising the Hedonistic, Satisfaction, and Extraversion poles increased, self-reported preventive health behavior scores would decrease. Predictions were not made for the Societal and Personal poles because Kristiansen did not report directions of influence for the two poles.

Hypothesis 4: Composite response time scores and composite certainty rating scores predict greater amounts of PHBS score variance than rank difference scores alone.

Exploratory Question 1: How does the PHBS mean and the rank of Health for this sample compare with PHBS means and ranks of Health reported in other studies?

Exploratory Question 2: Do some values compete more directly with health than other values?

Exploratory Question 3: How does health value compare with selected demographic variables as a predictor of PHBS scores?



## CHAPTER TWO

### Method

#### Subjects

One hundred twenty-two students enrolled in introductory psychology at the University of New Hampshire participated for one hour as part of a required laboratory experience. Appendix A contains a description of the sample by frequencies and percentages on major demographic characteristics: gender, age, annual family income, mother's occupation, father's occupation, mother's education, father's education, class standing, academic major, religious affiliation, current health status, and smoking status.

#### Materials and Scoring Procedures

The criterion measure was the Preventive Health Behavior Scale (Kristiansen, 1984b), henceforth referred to as the PHBS. Several predictor measures were obtained from the subjects' responses to the Rokeach Value Survey, namely, conventional ranks, normalized ranks, rank difference scores, response times, and certainty ratings.

Preventive Health Behavior Scale. The PHBS assesses health across 17 areas: a) alcohol consumption, b) dental hygiene, c) drug use, d) exercise, e) eye care, f) home safety, g) hygiene, h) immunization and avoidance of infection, i) information seeking, j) miscellaneous issues, k) nutrition and diet, l) physician consultation, m)

psychological health, n) smoking behavior, o) traffic safety, p) women's issues, and q) work and leisure. Women's issues have been excluded from present usage to make the scale comparable for both sexes, as in Kristiansen (1984b). The PHBS is reported to be internally consistent (Cronbach's  $\alpha = .82$ ), has demonstrated good test-retest reliability (Pearson's  $r = .91$ ) over a 5-week period, and has been shown to predict subsequent health status (Kristiansen, 1984). Appendix B contains the PHBS items used in the present study.

Because the PHBS was developed for British and Canadian subjects, some of the items were deemed inappropriate for use with a sample of American college students. Therefore, some changes to the original scale were made involving the deletion of item thirty-four, modifications to items ten, eleven, fourteen, and seventeen so the response categories were on a five-point scale, and some minor wording changes to be consistent with current American usage (See Appendix C).

PHBS scores were calculated summatively across 41 items using a 5-point Likert scale. However, items one, sixteen, twenty-two, and thirty-six required a 6th response category indicating non-participation in the activities described in the items. Items one, twenty-two, and thirty-six pertained to preventive health behavior practices during travel by automobile, bicycle, or motorcycle, and item sixteen pertained to watching health programs on television (See Appendix B). The mean item score computed

across the remaining 37 items was substituted for responses of 6 to these items in accordance with Kristiansen (1984b).

Measures of Values. A modified version of the Rokeach Value Survey (Rokeach, 1973) was administered using the 18 conventional value statements with the inclusion of "HEALTH (mental and physical well-being)" as a 19th value. Value statements were printed on separate 1" by 2" cards that subjects arranged in order of relative importance from 1 (most important) to 19 (least important). The instructions for the task approximated those accompanying the Rokeach Value Survey (form D) with modifications to accommodate the card sorting procedure. An additional modification to the instructions consisted of a brief statement which defined how the concept of terminal value should be understood. The statement read: "I believe that (insert value here) as an endstate of existence or ultimate goal is personally and socially worth striving for" (Rokeach, 1968, p.160). It was believed that this modification to the instructions would help to reduce variability arising from the projective component (open-ended interpretation of the value statements).

As in Feather's (1975) and Kristiansen's (1984a, 1985a, 1985c, 1986) studies, conventional value ranks for some analyses were converted to z-scores using a normalized rank transformation (Kenny, 1987). The conversion from conventional ranks to an approximation of the normal distribution involves computing a proportional rank using

the formula  $(\text{rank} - .5) / n$ , where  $n$  = sample size. In this instance  $n$  equals 19, the number of value statements. The proportions are used in conjunction with a cumulative normal distribution table that provides the probit transformation corresponding to each proportion. In the present study, the SPSSX (Norusis & SPSS Inc., 1988) numerical transformation function,  $\text{PROBIT}((\text{rank} - .5)/19)$  was used to generate normalized ranks.

By subtracting the conventional rank assigned to a given Rokeach value from the conventional rank assigned to health, rank difference scores were obtained, as in Kristiansen (1986). (Note that a rank of 1 designates the most important value and a rank of 19 designates the least important value.) Subtracting a given value's rank from the rank of health resulted in a score that represented the ordinal distance of that Rokeach value from health such that values ranked above health received a negative rank difference score and values ranked below health received a positive rank difference score. In order to make rank difference scores easier to interpret, each rank difference score was multiplied by negative 1 so that values ranked above health received positive scores and values ranked below health received negative scores. Rank difference scores conveyed two types of information about the ordinal position of given values relative to the ordinal position of health: a) the sign of the rank difference score indicated whether a given value was ranked above (positive) or below (negative) health, and b) the absolute numerical

value provided information regarding its ordinal distance (number of ranks) from health. It should be noted that the rank difference score for health was always equal to zero, hence, only 18 rank difference scores were reported.

Subjects indicated the degree of certainty that health was more or less important than each of the Rokeach values, depending upon whether health was ranked above or below the value in question, and in this manner certainty ratings were obtained. A scale ranging from 0 (very uncertain) to 100 (very certain) was provided for subjects to rate the degree to which they felt certain that each of the 18 Rokeach values was ranked in terms of its relative importance to health. This procedure resulted in 18 certainty ratings representing the comparison of health to each of the 18 Rokeach values. Individual differences in level of certainty were preserved by standardizing certainty ratings for each subject.

Subjects completed a forced-choice computer task in which pairs of value statements were presented on the screen of a Zenith Z-100 series computer using a ZBASIC program. Subjects read each of 118 pairs of statements, numbered "1" and "2", and then pressed one of two response keys also numbered "1" and "2", corresponding to the number of the statement they selected as most important. In this manner, response times were obtained. The order of presentation of the statements was randomized in the stimulus file and statements were presented in that fixed

order to all subjects. Random counterbalancing of statements on a subject-by-subject basis was considered but presented technical difficulties that could not be surmounted.

To minimize the number of comparisons required, only 6 values ("happiness", "true friendship", "mature love", "family security", "health", and "self-respect") were selected for comparison with each of the 18 other values. The selection of the 6 values was based upon previous pilot research showing that these 6 values were ranked in the top six ordinal positions of the survey by two independent and comparable groups of subjects. The response-times of primary interest were those corresponding to instances in which health was paired with each of the 18 Rokeach values.

Recorded within each subject's data was a measure of latency of response (0000 to 9999 milliseconds), a number representing the response key that was pressed (1 or 2), and a code representing which pair of statements was presented and which value statement was selected (1 to 19). On rare occasions a response key malfunctioned if a subject pulled the key too slowly. This generated an immediate second response and caused the program to record an extremely short response time (less than 15 milliseconds) for the next pair of statements. These accidental response times were deemed too brief a time for subjects to have read the 65 to 88 characters comprising the pairs of value statements. To prevent extremely short response times from contaminating the data, 400 milliseconds was chosen as a

lower cutoff point such that all shorter response times, (9 response times out of the 2196 used for analyses) were coded as missing data. An upper limit on response time was set at 9,999 milliseconds after which "Sorry, you're out of time" was printed on the screen and the next set of statements appeared. A total of 15 out of the 2,196 response times collected fell in this category and were treated as response times of 9,999 milliseconds. In order to retain information about individual differences in responding, standardized response times were computed for each subject.

Initial ideas for developing composite scores (latency-weighted scores, Gilbert, 1968) were derived from studies in personality conducted by Gilbert and his colleagues (Gilbert, 1960, 1961, 1968, 1986; Gilbert & Cable, 1967). Composite scores were reported to contain more precise information than raw scores alone. In the present study, the two composite scores, consisted of rank difference scores combined multiplicatively with either response times or certainty ratings. Response times and certainty ratings conveyed information about the difficulty subjects encountered when deciding which of two values was more important, rank difference scores conveyed information about direction (above or below) and distance (number of ranks) relative to health.

Computation of composite scores involved adding a constant to each standardized response time and certainty

rating that would ensure that all standard scores were positive, and then multiplying that number by the rank difference score for the corresponding value statement. Thus, the sign of the new composite score was determined solely by the sign of the rank difference score. Larger absolute numerical values of composite response time scores, for example, indicated that the corresponding values were ranked at a greater distance from health and that the decision took a relatively long time, whereas smaller absolute numerical values indicated that the ordinal distance as smaller and that the decision took a relatively short time. For composite certainty rating scores, larger absolute values indicated greater ordinal distance and greater certainty, whereas smaller absolute values indicated smaller ordinal distance and less certainty. Composite scores for health were computed by multiplying the rank assigned to health by a subject's average response time and certainty rating.

Demographic Variables. A questionnaire was administered that assessed subjects' gender, age, weight, height, annual family income, parent's education and occupation, academic major, year in college, religious affiliation and participation, current health status, marital status, smoking status, and physical symptoms of stress and illness. Only gender, current health status, annual family income, and smoking status were employed as predictors of PHBS, the remaining demographic variables were used only to describe the sample.



Other Measures. Two psychological scales were administered, the Multidimensional Health Locus of Control Scale (Wallston, Wallston, & DeVillis, 1978) and the Self-Monitoring Scale (Snyder, 1974, 1987). Because the primary focus of this study was to investigate measures of values, analyses involving the psychological scales were not conducted for this report.

#### Laboratory Procedure

When subjects arrived in the laboratory, they were asked to read and sign a form that provided a brief description of the study and asked for their consent as a participant. Upon obtaining consent, subjects were instructed to complete the demographics questionnaire.

Subjects were then escorted to an adjacent room where they were seated at a computer monitor for the forced-choice portion of the study. Subjects were instructed to read each pair of value statements, to choose the value statement from each pair that represented the value that was most important as a guiding principle in their life, and then to immediately pull and release the appropriate response key upon making the decision. A given pair of value statements remained on the computer screen until the subject responded or until 10 seconds elapsed. Subjects were instructed to make their decisions on the basis of their initial reactions ("gutt feelings") rather than to intellectually ponder each pair of statements.

Twelve pairs of statements similar to those comprising

the Rokeach Value Survey were presented as practice trials to familiarize subjects with the apparatus and procedure. Following the twelve practice statements, 108 pairs of value statements were presented in which the values, "Family Security", "Happiness", "Health", "Mature Love", "Self-Respect", and "True Friendship" were paired with every other value.

Upon completion of the forced-choice task, subjects were escorted back to the laboratory and given written as well as verbal instructions for completing the Value Survey. During this time subjects were seated at a table and had the instruction sheet, the value cards, and the card holder in front of them. Subjects were allowed to arrange the cards by any means they wished until they were satisfied with the order. Appendix B contains the actual instructions.

When subjects expressed satisfaction with their arrangement of the value cards, they were given written instructions for making the certainty ratings. The instructions asked subjects to select one and only one value card from among 19 cards that were displayed face down on the table. In order to disguise the fact that the value of health was the focus of the study, each of the 19 cards on the table contained the statement "HEALTH: Mental and Physical Well-being") which subjects were lead to believe were identical to the cards they had just finished ranking. If a subject had expressed suspicion about the content of the cards, a full explanation would have been

given and that subject would have been dismissed. None of the subjects expressed suspicion.

Although unlikely, it was possible that during the ranking task subjects remembered their responses on the forced-choice task and were merely responding in a manner that made them appear consistent on the two tasks. To investigate this possibility, during the course of the experiment 30 randomly selected subjects were asked, "If you had wanted to do so, could you have been consistent on the two tasks?" Subjects unanimously stated that they could not remember how they had responded on the forced-choice task because of the number of statements presented and because the forced-choice task gave the illusion of being repetitious.

Following the ranking task, subjects completed a small packet of questionnaires containing the PHBS. Upon completion of the questionnaires, subjects were thoroughly debriefed with respect to the purpose of the study and the deceptive manipulation involving the 19 health cards, and were then dismissed. The total participation time ranged from 35 minutes to 70 minutes with an average participation time of approximately 40 minutes. Appendix B contains the actual debriefing statement

#### Statistical Analyses

The various predictors (values) and criterion (PHBS) were examined in regard to reliability and validity. Regression analyses were conducted and, as a point of

comparison, PHBS scores for this sample were compared with PHBS scores obtained on other samples, and the relation of demographic variables to PHBS were assessed.

Cronbach's alpha coefficient was calculated for the PHBS for this sample and was compared with alpha coefficients reported in other studies.

Correlational analyses were conducted to determine the relation between a) certainty ratings and response-times, b) response times and the lengths of value statements, c) rank difference scores, response times, and certainty ratings, and d) conventional ranks and forced-choice ranks. The predictive validity coefficients were assessed by computing correlations between e) value ranks and PHBS, f) rank difference scores and PHBS, and g) composite scores and PHBS, and by regressing each of the four predictors on PHBS scores.

Correlations Among Predictor Variables. Two approaches were used to examine the relation between response times and certainty ratings, idiographic and nomothetic. The idiographic approach involved computing Pearson's product-moment coefficients across the 18 pairs of response times and certainty ratings associated with each value, on a subject-by-subject basis. This resulted in a single correlation coefficient reflecting the relation between response times and certainty ratings for each of  $n = 122$  subjects.

Two somewhat redundant but distinct approaches were employed to examine nomothetic correlations. The first

involved treating the  $n = 122$  idiographic correlation coefficients as individual scores from which a mean and variance was computed followed by a t-test to determine whether the averaged correlation between response times and certainty ratings was significantly different from zero. The second approach was an attempt to circumvent the problem of rounding error owing to the fact that the idiographic correlations were rounded to 4 decimal places. The SPSSX WRITE command was used to create a two-column data set containing 2,196 pairs (18 values x 122 subjects) of response times and certainty ratings and a second Pearson's  $r$  was computed.

The differences in length of value statements may have influenced the correlation between response times and certainty ratings by introducing systematic variability in response times arising from differences in reading time (Temple & Geisinger, 1990). In order to determine whether response times were systematically related to the number of characters comprising pairs of value statements (range = 64 to 88 characters, mean = 78.67 characters with standard deviation = 6.95 characters), a Pearson's correlation was computed between averaged response time for each pair of statements and total number of characters including spaces and punctuation associated with that pair of statements.

Knowledge of the relation between response times and certainty ratings may be enhanced by examining that relation, albeit statistically, within the context of rank

difference scores. Correlation coefficients were computed for response times and rank difference scores, and for certainty ratings and rank difference scores, to observe the relation among the 18 pairs of correlations.

The relation between value ranks and forced-choice ranks was examined by computing ranks for the forced-choice task based upon the proportion of times that each value was chosen instead of "health" relative to the total number of presentations ( $n=122$ ). Ranks from the Rokeach Value Survey were computed for both median and mean ranks for each value. Spearman's rank-order correlations were computed as a measure of relation between the median for conventional ranks and forced-choice ranks, and between the mean for conventional ranks and forced-choice ranks. Owing to the fact that pairs of ranks was obtained for each of  $n = 122$  subjects, that the pairs of ranks were not independent, and that a small number of tied ranks were present, Kendall's tau was also computed for both mean and median ranks. Kendall's tau provides a more conservative estimate of the relation between pairs of variables than the Spearman's correlation because it is less influenced by nonindependence in pairs of ranks.

Validity Coefficients. To discern the relation between value ranks and PHBS scores, the ranks were normalized and Pearson's r was computed. The relation between rank difference scores and PHBS scores was examined using both Pearson's r and Kendall's tau. The relation between the two composite scores and PHBS scores was examined using

Pearson's  $r$ .

Regression Analyses. Two types of regression analysis, stepwise and full-model, were employed to examine the contributions of the various measures of values for predicting PHBS scores. The term "full-model" refers to regression analyses in which main effects and all interaction effects are regressed on a criterion variable. SPSSX stepwise regressions were employed to predict PHBS from a) normalized ranks for the 19 values, and b) 18 rank difference scores. Residuals were plotted against predicted scores to facilitate detection of the presence of outliers. Mahalanobis' distance and Cook's distance for each subject were also examined to identify the presence of multivariate outliers.

SPSSX was also used to perform full-model regression analyses to predict PHBS from the value dimensions reported by Kristiansen (1985c). Separate full-model regression equations (i.e., main effects entered followed by two-way interactions, three-way interactions, and four-way interactions), based upon four classes of predictors, were computed for the positive pole and negative pole of each of the four value dimensions: (i.e., noble(+) versus hedonistic(-), personal(+) versus societal(-), satisfaction(+) versus safety(-), and extraversion(+) versus introversion(-)). The four classes of predictors consisted of a) normalized value ranks, b) standardized rank difference scores, c) composite response time scores,

and d) composite certainty rating scores.

Analyses on Demographic Variables. The demographic variables (gender, current health status, annual family income, socioeconomic status, and smoking status) were employed as factors to determine the effectiveness of values compared to demographic variables for explaining variance in PHBS scores. Health value was included as a factor along with each of the demographic variables in order to identify possible interactions, with the exception of the analysis involving gender. An analysis was also conducted to determine whether the value of health was different depending upon the gender of college students. It was anticipated that gender differences would be evidenced by females reporting higher PHBS scores than males (Kristiansen, 1984b, 1989). Preventive health behavior was anticipated to increase along with annual family income.



## CHAPTER THREE

### Results

Prior to testing specific hypotheses, the data were examined to ascertain whether PHBS scores and the rank of Health were comparable with other studies. In addition, reliabilities and internal consistencies were examined to determine whether the measures employed in the present study were temporally stable and homogeneous.

#### Exploratory Question 1

This question asked whether PHBS means for this sample were similar to PHBS means reported in other studies, and whether centrality measures of the rank of Health in the present study were comparable to centrality measures of Health reported in other studies?

PHBS Score Means. Only two studies (Kristiansen, 1984b; Kristiansen & Harding, 1985) reporting total PHBS scores were found. The mean PHBS score for the entire sample in the present study, Mean = 136.35 (SD = 17.57), appeared similar to the mean for Canadian college students, Mean = 134 (SD not reported), and larger than the mean for British college students, Mean = 127 (SD not reported), reported by Kristiansen and Harding (1985). Compared to the mean for Canadian college students, Mean = 140.5 (SD = 15.8), (Kristiansen, 1984b), the mean in the present study was significantly lower,  $t(351) = 2.28$ ,  $p < .05$ ; however, the PHBS score mean in the present study was significantly

higher,  $t(453) = 5.82$ ,  $p < .01$ , than the mean for British college students, 125(17.4). The mean for females = 143.15 ( $SD = 16.04$ ) and the mean for males = 125.86 ( $SD = 14.48$ ) in the present study were not significantly different from the mean for Canadian females = 142.9 ( $SD = 14.0$ ) or the mean for Canadian males = 131.4 ( $SD = 18.7$ ) reported by Kristiansen (1984b).

It appears that subjects in this sample fall in between Canadians and Britons in terms of their self-reported involvement in preventive health behavior. Consideration needs to be given to the fact that there is a six year time difference between studies which does not speak for changes in the practice of preventive health behavior in Britain and Canada that occurred during that time. What the data do show is that the subjects' PHBS scores in the present study were not highly discrepant from PHBS scores in the earlier studies.

Health Value Means. Owing to the diversity in measures of health value, comparisons between studies are difficult. For example, in a number of studies that employed abbreviated versions of the Rokeach Value Survey, the actual values surveyed were not clearly specified. Such omissions compromise interpretations of the different ranks assigned to health (i.e., Abella & Heslin, 1984; Laffery & Isenberg, 1983; Lau et al. 1986; Wurtele, et al., 1985). It is not meaningful, therefore, to say that a rank of 5 in one study is necessarily the same as a rank of 5 in another study.

Table 1 presents the means, standard deviations, and medians for the 19 values in the present study. Health, for the entire sample, was ranked second in importance (Mean = 5.0, SD = 3.76, Md = 4.0, Normalized Mean = -.85, Normalized SD = .71), out-ranked only by Family Security. The mean rank of Health for males was 4.81, SD = 3.91, (normalized mean = -.74, normalized SD = .618) and for females the mean rank was 5.48, SD = 3.53, (normalized mean = -.925, normalized SD = .759). Table 2 presents the means, standard deviations, and medians for the 18 rank difference scores. Family Security had the only positive rank difference score, National Security was the value ranked the greatest ordinal distance from Health (Mean = -10.205, SD = 5.88, Md = -12).

Bearing in mind the difficulties of interpretation, the mean rank for health in the present study (Mean = 5.0) does not appear unusual compared to other studies, (Mean = 3.9, Abella & Heslin, 1984), (Mean = 2.3, Laffery & Isenberg, 1983), (Mean = 7.6, Lau et al., 1986), or (Mean = 5.9, Wurtele et al., 1985). However, when an attempt was made to compare the relative location of health in the present study (ranked 2nd among 19 values) with other studies (ranked 2nd among 9 values, Abella & Heslin), (location not specified, Laffery & Isenberg), (5th among 9 values, Lau et al.), or (location not specified, Wurtele et al.), it became readily apparent that comparisons were not possible. However, it is clear health was one of the most

Table 1

Means, standard deviations, and medians for value ranks.

Value Name	Mean	Standard Deviation	Median
1 Family Security	4.42	3.70	3.0
2 Health	5.07	3.76	4.0
3 Self-Respect	5.26	3.61	4.5
4 True Friendship	5.47	2.93	5.0
5 Happiness	5.53	4.00	4.0
6 Mature Love	7.80	4.16	7.0
7 Freedom	8.54	3.90	8.5
8 Inner Harmony	9.12	5.31	8.5
9 Wisdom	10.03	4.30	10.0
10 Equality	10.36	4.31	11.0
11 Accomplishment	10.93	3.83	11.0
12 World at Peace	11.65	4.88	13.0
13 Comfortable Life	11.91	4.34	12.0
14 Exciting Life	12.50	4.24	13.0
15 Pleasure	12.60	3.65	13.0
16 Social Recognition	13.95	3.93	15.0
17 Salvation	14.77	6.22	18.0
18 World of Beauty	14.82	3.78	16.0
19 National Security	15.28	4.10	17.0

Table 2

Means, standard deviations, and medians for rank difference scores.

Value Name	Mean	Standard Deviation	Median
Family Security	.66	5.55	1.0
Health	0.00	0.00	0.0
Self-Respect	- .19	5.14	- 1.0
True Friendship	- .39	5.11	- 1.0
Happiness	- .45	5.05	1.0
Mature Love	- 2.72	5.88	- 3.0
Freedom	- 3.47	5.57	- 4.0
Inner Harmony	- 4.05	6.45	- 5.0
Wisdom	- 4.96	6.15	- 6.0
Equality	- 5.29	6.14	- 6.0
Accomplishment	- 5.85	5.49	- 7.0
World at Peace	- 6.57	6.45	- 7.5
Comfortable Life	- 6.84	5.52	- 7.0
Exciting Life	- 7.43	5.66	- 8.0
Pleasure	- 7.53	4.98	- 8.0
Social Recognition	- 8.88	5.45	-10.0
Salvation	- 9.70	7.49	-12.5
World of Beauty	- 9.75	5.87	-11.0
National Security	-10.21	5.88	-12.0

Note. Rank difference score = (value rank minus rank of health) times negative 1.

Note. Score for health = rank of health minus rank of health equals zero.

important values for subjects in the present sample.

Reliabilities and Internal Consistencies. The procedure employed in the present study did not permit the assessment of test-retest reliabilities; therefore, indices of temporal stability from previous studies were reported. Also, the ordinal data produced by the Rokeach Value Survey and the computerized forced-choice task did not permit an assessment of internal consistency. This was due primarily to the fact that the Survey means and variances for all subjects were necessarily identical; hence, there was no variability across subjects for computing an alpha coefficient. Secondly, the assumption of independence that underlies the interpretation of correlation coefficients (Cronbach, 1990) is violated by ranking procedures. A Kendall's tau coefficient of .69 (median ranks) between the conventional ranks and the forced-choice ranks did, however, provided an estimate of alternate forms reliability. This coefficient, described in greater detail below, suggests that the two measures were reasonably comparable in their measurement of values. The short time period between administrations was not sufficient to justify interpreting the coefficient as a measure of test-retest reliability (Anastasi, 1982).

Rokeach (1973) reported reliability coefficients for the Value Survey ranging from .51 to .88, over a 3 to 7 week test-retest period, among college students. The most reliable of the value instruments developed by Rokeach consisted of 18 pasteable labels that subjects could easily

remove and repaste as they ranked the labels in order of importance. Because the value instrument used in the present study consisted of 19 separate value cards, the test-retest reliability estimates reported by Rokeach are applicable here. A test-retest reliability of .51 indicated that subjects' time 1 and time 2 scores were only moderately correlated suggesting that the instrument was rather unstable for use in scientific research. However, an examination of tabled data reported by Rokeach showed that only 23 out of 250 subjects produced test-retest coefficients that small. An average reliability coefficient computed from Rokeach's (1973) tabled data and representing approximately 450 college students was .78 over a period ranging from 3 weeks to 4 months. It is clear that the reliability coefficients for the Rokeach Value Survey are not exceptionally strong, but it is the opinion of this researcher that they fall within an acceptable range given the subjective nature of the ranking task.

The internal consistency of the Preventive Health Behavior Scale for the present sample,  $\alpha = .85$  ( $n = 122$ ), was comparable to alpha coefficients obtained in other studies: .82 ( $n = 970$ ) (Kristiansen, 1984), .74 ( $n = 181$ ) (Kristiansen, 1985b), averaged  $\alpha = .81$  ( $n = 564$ ) (Kristiansen & Harding, 1985). Kristiansen (1984b) reported a test-retest reliability coefficient of .91 over a 5-week interval using a sample of ( $n = 182$ ) middle-aged

university staff.

#### Correlations Among Predictor Variables

Analyses were conducted to determine the relation between conventional ranks and forced-choice ranks and between response times and certainty ratings.

Hypothesis 1. Proportions ranging from 18/122 (.147) for the values "National Security" and "Salvation" to 75/122 (.615) for the value "Family Security" were obtained from the forced-choice task and employed to examine the relation between conventional ranks and forced-choice ranks. The obtained  $\rho(18) = .86$ , between mean conventional ranks and forced-choice ranks was highly significant  $z = 9.46$ ,  $p < .0000$ . The same correlation based on median ranks yielded a  $\rho(18) = .84$ , also highly significant  $z = 9.24$ ,  $p < .0000$ . The obtained  $\tau(18) = .70$  for mean ranks was also highly significant  $z = 3.9$ ,  $p < .0001$ , as was the  $\tau(18) = .69$  based on median ranks,  $z = 3.9$ ,  $p < .0001$ . Kendall's  $\tau$  is the preferred index for nonindependent ranked data (Bruning & Kintz, 1987; Feather, 1973). The highly significant coefficients indicate that the two ranking procedures produced very similar value hierarchies. Figure 1 displays conventional ranks plotted against forced-choice ranks.

Other research has also demonstrated that different value assessment procedures did not influence subjects' ordering of the Rokeach values. Feather (1973) addressed this question by comparing a conventional ranking procedure with a Likert format, 8-point rating scale and obtained a



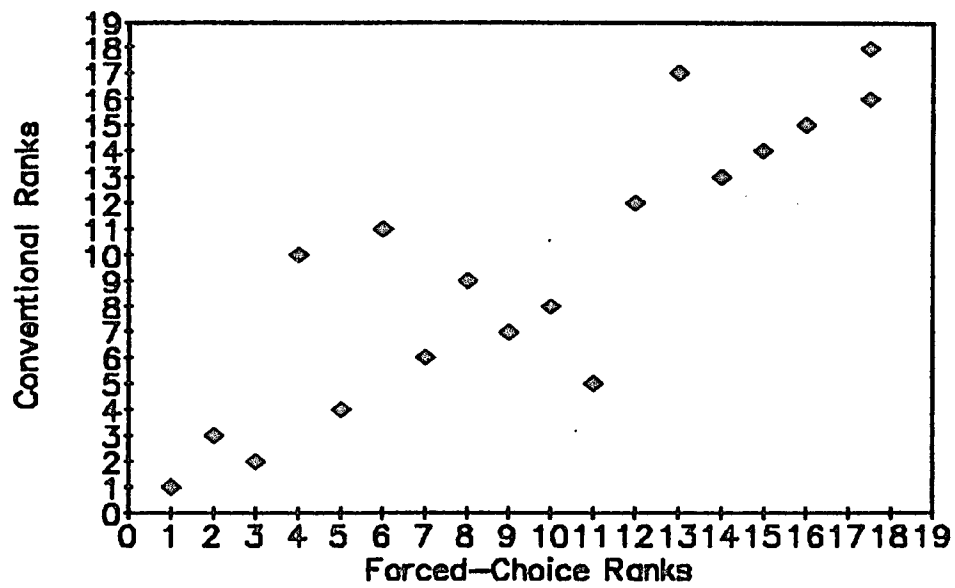


Figure 1. Scatterplot showing the relation between conventional ranks and forced-choice ranks ( $\tau(18) = .70$ ,  $p < .0001$ ).

$\tau(17) = .81$  for mean ranks and  $\tau(17) = .83$  for median ranks. Feather also compared a paired-comparison procedure with the conventional ranking procedure and obtained a  $\tau(17) = .77$  for mean ranks and  $\tau(17) = .78$  for median ranks. The results demonstrated that the relative importance of values was not strongly influenced by type of measurement procedure. A related investigation conducted by Homant (1969) compared a semantic differential procedure with the conventional ranking procedure and found that the relative locations of the to values were similar,  $\rho(17) = .68$ .

Hypothesis 2. Idiographic and nomothetic correlations were examined to determine the relation between response times and certainty ratings. Under the constraints of the lower limit of 400 ms (milliseconds) placed on response times, the range was 482 ms to 9,999 ms (Mean = 3,316.7 ms,  $SD = 1,882.4$  ms). Certainty ratings ranged from 0 to 100 (Mean = 79.4,  $SD = 22.9$ ).

When correlations between response times and certainty ratings were examined idiographically, coefficients were found to range from  $r = .45$  to  $r = -.67$ . The distribution had a nonsignificant negative skew,  $Sk = -.18$ , standard error of skewness was  $SEsk = .23$ . The distribution was also nonsignificantly flatter (platykurtic) than the normal distribution,  $Kur = -.54$ ,  $SEkur = .449$ .

When the correlations were examined nomothetically, a mean correlation  $r(114) = -.10$  was obtained. A t-test for

the significance of  $r$  (Glass & Hopkins, 1984),  $t(112) = -1.09$ ,  $p > .05$ , was nonsignificant indicating that response times and certainty ratings were unrelated for this sample.

The question of whether response times were influenced by the length (number of characters) of value statements was assessed by computing a Pearson's correlation coefficient between average standardized response times and number of characters for each pair of value statements. The coefficient was computed in this manner because statement length was constant for each subject which resulted in zero variance for number of characters. The resulting coefficient,  $r(16) = -.12$ ,  $p > .10$ , was nonsignificant indicating that statement length did not have an effect on response time.

Because response times and certainty ratings were obtained by asking subjects to compare the rank of each value against the rank they assigned to health, the relation between response times and rank difference scores and between certainty ratings and rank difference scores was examined. Table 3 presents Kendall's  $\tau$  coefficients between rank difference scores and standardized response times, and the correlations between rank difference scores and standardized certainty ratings. The rank difference scores in Table 3 are presented in order of magnitude, from largest positive score to largest negative score. An examination of Table 3 shows an apparent pattern among the coefficients such that significant coefficients tend to cluster at the tops and bottoms of the distributions.

Table 3

Correlations (Kendall's Tau) between rank difference scores and response times and between rank difference scores and certainty ratings, (values listed in order of magnitude of mean rank difference scores).

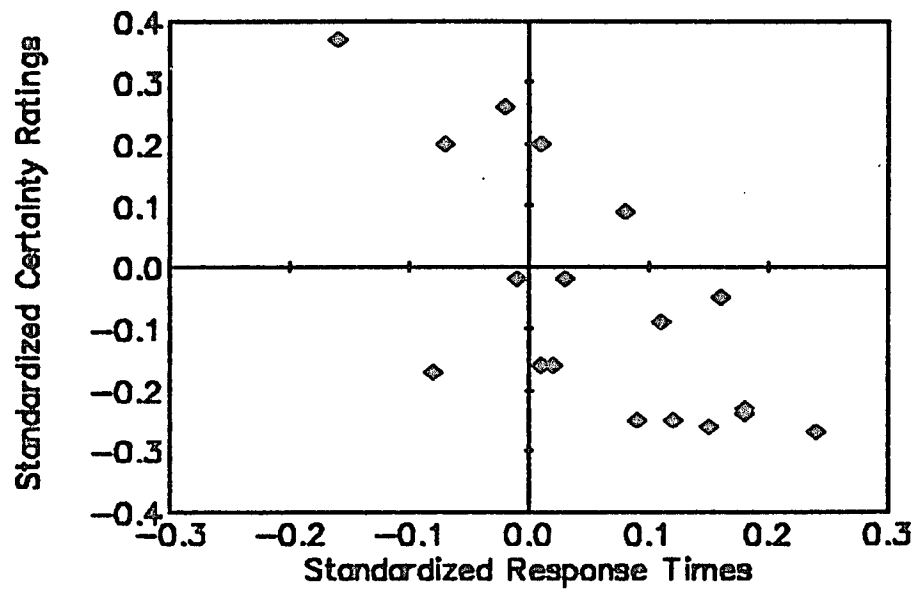
Value Name	Mean Rank Difference Score (sd)	Correlations	
		Response Time (n)	Certainty Rating
Family Security	.66 (5.55)	-.16 (122)**	.37***
Self-Respect	-.19 (5.14)	.01 (122)	.20***
True Friendship	-.39 (5.11)	-.07 (121)	.20***
Happiness	-.45 (5.05)	-.02 (120)	.26***
Mature Love	-2.72 (5.86)	.03 (122)	-.02
Freedom	-3.47 (5.57)	.08 (122)	.09
Inner Harmony	-4.05 (6.45)	-.01 (121)	-.02
Wisdom	-4.96 (6.15)	.01 (121)	-.16**
Equality	-5.29 (6.14)	.16 (122)**	-.05
Accomplishment	-5.85 (5.49)	-.08 (122)	-.17**
World at Peace	-6.57 (6.45)	.02 (122)	-.16**
Comfortable Life	-6.84 (5.52)	.12 (121)*	-.25***
Exciting Life	-7.43 (5.66)	.09 (120)	-.25***
Pleasure	-7.53 (4.98)	.18 (122)**	-.24***
Social Recognition	-8.88 (5.45)	.15 (122)**	-.26***
Salvation	-9.70 (7.49)	.11 (122)*	-.09
World of Beauty	-9.75 (5.87)	.24 (122)***	-.27***
National Security	-10.21 (5.88)	.18 (121)**	-.23***

Note. \* $p < .05$ , one-tailed. \*\* $p < .01$ , one-tailed. \*\*\* $p < .001$ , one-tailed.

Note. All  $n$ 's equal 122 for certainty ratings.

Note. Rank Difference Score Std. Dev's. in parentheses.

Note. Response time  $n$ 's in parentheses.



**Figure 2.** Kendall's tau coefficients between standardized response times and standardized certainty ratings when paired by magnitude of rank difference scores ( $\tau(16) = -.71, p < .001$ ).

Notice also that coefficients for certainty ratings were consistently larger than coefficients for response times. There were several potential explanations for these findings which will be considered in the discussion below. Figure 2 displays standardized response times plotted against standardized certainty ratings when paired in order of magnitude of rank difference scores.

#### Validity Coefficients

Prior to testing Hypothesis 3, preliminary correlational and stepwise regression analyses were conducted to examine the relation between the various measures of values and PHBS scores.

Correlations with PHBS scores. Kendall's Tau coefficients between PHBS scores and conventional value ranks, and between PHBS scores and rank difference scores are presented in Table 4. It can be seen in Table 4 that the ranks for Health ( $r = -.15$ ), Inner Harmony ( $r = -.21$ ), Self-Respect ( $r = -.12$ ), and Wisdom ( $r = -.12$ ) were significantly related to PHBS scores, such that increases in PHBS scores were associated with greater importance for the four values. The rank for True Friendship ( $r = .11$ ), on the other hand, was positively correlated with PHBS scores indicating that greater importance was associated with lower PHBS scores. (Note: A smaller numerical rank indicates greater importance.)

Table 5 contains Pearson's  $r$  coefficients between PHBS scores and normalized value ranks, composite response time scores, composite certainty rating scores, and standardized

Table 4

Kendall's Tau coefficients between PHBS scores and value ranks (RNK), and between PHBS scores and rank difference scores (RDS), arranged by magnitude of RNK coefficients.

Value Name	RNK	RDS
Inner Harmony	-.21***	.10
Health	-.15*	--
Wisdom	-.12*	.02
Self-Respect	-.12*	-.02
A Sense of Accomplishment	-.05	-.04
A World of Beauty	-.03	-.11*
Equality	-.03	-.07
A World at Peace	.02	-.12*
A Comfortable Life	.03	-.09
Salvation	.03	-.08
Freedom	.04	-.11*
Happiness	.05	-.19***
An Exciting Life	.06	-.09
Pleasure	.06	-.16**
Mature Love	.06	-.13*
Social Recognition	.06	-.14*
National Security	.10	-.17**
True Friendship	.11*	-.18**
Family Security	.12	-.18**

Note. \*p<.05, one-tailed. \*\*p<.01, one-tailed. \*\*\*p<.001, one-tailed.

Note. Rank difference score for health not computed because health minus itself equals zero.

Table 5

Pearson's coefficients between PHBS scores and normalized value ranks (NRNK), composite response time scores (RDRT), composite certainty rating scores (RDCE), and standardized rank difference scores (RDS), arranged by magnitude of NRNK coefficients.

Value Name	NRNK	RDRT	RDCE	RDS
Inner Harmony	-.31***	.13	.14	.13
Health	-.23**	---	---	---
Wisdom	-.18*	.02	.01	-.01
Self-Respect	-.15	-.06	-.05	-.06
A Sense of Accomplishment	-.09	-.08	-.07	-.08
A World of Beauty	-.04	-.13	-.09	-.12
Equality	.00	-.12	-.14	-.12
A World at Peace	.00	-.16*	-.17*	-.15
A Comfortable Life	.01	-.15	-.14	-.15*
Salvation	.06	-.17*	-.11	-.15*
Freedom	.07	-.19*	-.21**	-.19*
An Exciting Life	.07	-.18*	-.17*	-.19*
Happiness	.08	-.25**	-.22**	-.23**
Pleasure	.08	-.21**	-.20*	-.22**
Mature Love	.09	-.18*	-.17*	-.18*
Social Recognition	.10	-.23**	-.21**	-.24**
National Security	.16*	-.24**	-.25**	-.24**
True Friendship	.16*	-.24**	-.24**	-.23**
Family Security	.16*	-.23**	-.24**	-.24**

Note. \*p<.05, one-tailed. \*\*p<.01, one-tailed. \*\*\*p<.001, one-tailed.

Note. Rank difference score for health not computed because health minus itself equals zero. Composite scores for health also not reported because they included rank difference scores.



rank difference scores. For normalized ranks, it can be seen that Health ( $r = -.23$ ), Inner Harmony ( $r = -.31$ ), True Friendship ( $r = .16$ ), and Wisdom ( $r = -.18$ ), like conventional ranks, were correlated with PHBS scores. The coefficient for Self-Respect ( $r = -.15$ ) became nonsignificant, whereas the coefficients for Family Security ( $r = .16$ ) and National Security ( $r = .16$ ) became significant. A negative coefficient indicates that as rank approached one (most important), PHBS scores increased. The larger coefficients associated with normalized ranks as compared with conventional ranks in Table 4 show the greater power of parametric correlation procedures.

Stepwise regressions. The analyses predicting PHBS scores from normalized value ranks resulted in Inner Harmony entering the equation on the first step ( $Rsq$  change = .098,  $B = -6.15$ ) and Health entering the equation on the second step explaining an additional 5% of the PHBS score variance ( $B = -5.56$ ). That Inner Harmony was the first value to enter was expected given the algorithm used by stepwise regression which first enters the variable having the largest zero-order correlation with the criterion variable followed by selection according to largest partial correlation with the criterion. The value, A World at Peace was automatically excluded by the program to compensate for multicollinearity that arose when all the values were entered simultaneously. Unstandardized regression coefficients were reported because the predictors were standardized prior to the analyses (Jaccard

et al., 1990). Jaccard et al. advise that unstandardized coefficients can be interpreted in the same manner as standardized coefficients providing the variables are themselves standardized. Residuals were plotted against predicted scores in order to detect multivariate outliers. None were present.

For normalized, a negative regression coefficient indicated that greater importance was related to higher PHBS scores. Greater importance associated with both Inner Harmony and Health was related to higher PHBS scores. Furthermore, Health accounted for a significant amount of PHBS score variance after controlling for the influence of Inner Harmony.

Two types of information were provided by rank difference scores: a sign (positive -- above health, or negative -- below health), and a distance (magnitude of the score) from health. As can be seen in Table 2, Family Security (mean = .66) was the only value that was, on average, ranked above Health, if only marginally so, whereas, Inner Harmony (mean = -4) was, on average, ranked 4 units below Health.

An examination of Table 5 shows that 11 rank difference scores were significantly correlated with PHBS scores: A Comfortable Life ( $r = -.15$ ), An Exciting Life ( $r = -.19$ ), Family Security ( $r = -.24$ ), Freedom ( $r = -.19$ ), Happiness ( $r = -.23$ ), Mature Love ( $r = -.18$ ), National Security ( $r = -.24$ ), Pleasure ( $r = -.22$ ), Salvation ( $r = -$

.15), Social Recognition ( $r = -.24$ ), and True Friendship ( $r = -.23$ ). The negative coefficients associated with all 11 rank difference scores indicated that higher PHBS scores were associated with greater ordinal distance relative to Health, or conversely, that greater importance relative to Health for each of the values was associated with lower PHBS scores. Interestingly, the positive coefficient between Inner Harmony and PHBS was nonsignificant, however, Inner Harmony was the only value whose rank difference score was positively correlated with PHBS scores indicating that greater importance, relative to Health, was associated with higher PHBS scores.

The stepwise regression employing rank difference scores as predictors of PHBS scores produced an equation having a different set of values. National Security had the highest zero-order correlation,  $r = -.244$ ,  $p < .01$ , with PHBS scores (see Table 5) and entered the equation on the first step, ( $RsqCh = .062$ ,  $B = -.748$ ). Inner Harmony entered on the second step ( $RsqCh = .09$ ,  $B = .554$ ), followed by Happiness entered on the third step ( $RsqCh = .054$ ,  $B = -.892$ ), accounting for 15.3% of the variance in PHBS. No outliers were detected in plots of residuals.

Regression coefficients were automatically adjusted at each step in the analysis to reflect the strength of each predictor in relation to the other predictors in the equation. An examination of these final set of regression coefficients indicated that Happiness ( $b = -.892$ ) had a stronger influence of PHBS scores than did either National

Security ( $b = -.701$ ) or Inner Harmony ( $b = .762$ ). Stepwise analyses, however, are difficult to interpret because the algorithm predetermines which predictor enters the equation first and all subsequent entries are influenced by the first entry. This researcher became skeptical of the apparent predictive strength of National Security. In order to determine the relative strength of that value, a second regression analysis was conducted in which all of the rank difference scores were entered simultaneously. An examination of the regression coefficients revealed that Inner Harmony ( $b = .831$ ) had the strongest influence on PHBS scores followed by Happiness ( $b = -.702$ ). The regression coefficient for National Security ( $b = -.306$ ) was substantially smaller than was found in the earlier analysis. The purpose of analyses involving rank difference scores is to determine which values, relative to the value of Health, exert the strongest influence on PHBS scores. The results of the latter analysis indicate that greater the ordinal distance between Happiness and Health was associated with higher PHBS scores.

Hypothesis 3. Full-model regressions were conducted on each value pole using 4 types of predictors, normalized ranks, standardized rank difference scores, standardized composite response time scores, and standardized composite certainty rating scores. Included within each analysis were the main effects and all possible interactions, as in Jaccard et al. (1990). In multiple regression analyses,

the analysis of interactions is conducted by first entering the main effect predictors, followed by multiplicative terms corresponding to second-order interactions, which are followed in turn by multiplicative third-order interactions, and so on. The regression approach to analyzing interactions is preferred over analysis of variance under conditions in which dichotomizing or trichotomizing predictors results in unequal  $n$ 's in the various cells. This was the case in the present study.

Tables 6 and 7 contain the results of the regression analyses for which there were significant main effects or significant interactions. Table 6 presents the value pole, class of predictor (i.e., normalized value rank, standardized rank difference scores, composite response time scores, or composite certainty rating scores), the degrees of freedom associated with each analysis, the amount of change to R-square attributed to significant main effects or interactions, and the significance levels associated with the size of R-square. Table 6 should be consulted in conjunction with Table 7 which presents the unstandardized regression coefficients associated with only significant main effects and significant interactions. The unstandardized regression coefficients for the values comprising the main effects are displayed vertically under the column headed by the type of predictor with which they were associated. The names of the values comprising each of the value poles are presented in rows under the name of the value pole. Interactions are identified using the

Table 6

Percent of change in the amount of PHBS score variance accounted for by main effects and interactions for normalized ranks (NRNK), rank difference scores (RDS), composite response time scores (RDRT), and composite certainty rating scores (RDCE).

Type of Predictor	R-SQ Change	df	F Change	Sig F Change
NOBLE POLE				
NRNK (main effect)	.099	F(4,117)	= 3.25,	p<.02
RDS (PxExI inter)	.123	F(14,107)	= 4.46,	p<.003
RDRT (PxExI inter)	.122	F(14,106)	= 4.44,	p<.003
RDCE (PxExI inter)	.097	F(14,107)	= 3.38,	p<.008
SOCIETAL POLE				
RDS (PxFxN inter)	.043	F(7,114)	= 5.81,	p<.007
RDRT (PxFxN inter)	.034	F(7,113)	= 4.44,	p<.02
RDCE (main effect)	.067	F(3,118)	= 2.83,	p<.05
(PxFxN inter)	.035	F(7,114)	= 4.72,	p<.04
SAFETY POLE				
NRNK (main effect)	.079	F(3,118)	= 3.39,	p<.03
RDS (main effect)	.070	F(2,119)	= 4.48,	p<.02
RDRT (main effect)	.071	F(3,110)	= 2.80,	p<.05
RDCE (main effect)	.072	F(3,118)	= 3.06,	p<.04
EXTRAVERT POLE				
RDS (main effect)	.057	F(2,119)	= 3.62,	p<.03
RDRT (main effect)	.054	F(2,117)	= 3.32,	p<.04
INTROVERT POLE				
NRNK (main effect)	.149	F(3,118)	= 6.88,	p<.001
RDS (main effect)	.056	F(2,119)	= 3.55,	p<.04
RDRT (main effect)	.139	F(3,110)	= 5.93,	p<.001
RDCE (main effect)	.144	F(3,118)	= 6.59,	p<.001

Note. Regression df = 2 for RDS on Safety and Introversion poles because rank difference scores for health equal zero.

Note. There were no significant main effects or interactions for the Hedonsitic, Personal, or Satisfaction Poles.

Table 7

Unstandardized regression coefficients (b) for significant main effects and interactions using normalized value ranks (NRNK), standardized rank difference scores (RDS), standardized composite response time scores (RDRT), or standardized composite certainty rating scores (RDCE) to predict PHBS scores.

Value Pole with Value Names	Unstandardized Regression Coefficients			
	NRNK	RDS	RDRT	RDCE
NOBLE POLE				
A World at (P)eace	- .81			
A World of (B)eauty	.56			
(E)quality	- .46			
(I)nnner Harmony	-6.35***			
(P x E x I) Interaction		-7.51**	-7.48**	-6.14*
SOCIETAL POLE				
A World at (P)eace				.44
(F)reedom				-1.57
(N)ational Security				-3.64
(P x F x N) Interaction		-2.44*	-2.08*	-2.19*
SAFETY POLE				
(F)amily Security	2.17	-2.39	-2.44	-2.25
(H)ealth	-5.09*	----	.19	.22
(N)ational Security	2.68	-2.72	-2.94	-3.10
EXTRAVERSION POLE				
An (E)xciting life			-.96	-.98
(S)ocial Recognition			-3.50	-3.35
INTROVERSION POLE				
(I)nnner Harmony	-6.12***	3.36*	6.48***	6.72****
(H)ealth	-5.51**	----	-6.85**	-7.60****
(S)alvation	.34	-3.62*	-1.00	.24

Note. \*p<.05, one-tailed. \*\*p<.01, one-tailed. \*\*\*p<.001, one-tailed. \*\*\*\*p<.0001, one-tailed.

Note. b's not reported for Health RDS on Safety and Introversion poles because Health RDS = 0 for every subject.

Note. There were no significant main effects or interactions for the Hedonsitic, Personal, or Satisfaction Poles.

parenthesized letters of the value names to designate both the nature of the interaction (i.e., three-way) and the predictors involved in the interaction (i.e.,  $P \times E \times I$  identifies the Peace  $\times$  Equality  $\times$  Inner Harmony interaction listed under the Noble pole in Table 7). As suggested by Jaccard et al. (1990), all predictors were standardized and unstandardized regression coefficients were reported in Table 7.

For the Noble Pole, a main effect was found for only normalized ranks ( $RSq.Chg. = .099$ ,  $F(4,117) = 3.25$ ,  $p < .02$ ). The only significant regression coefficient was associated with Inner Harmony,  $b = -6.35$ ,  $p < .001$ . Significant three-way interactions were found for standardized rank difference scores,  $b = -7.51$ ,  $p < .01$ , ( $RSq.Chg. = .123$ ,  $F(14,107) = 4.46$ ,  $p < .003$ ), composite response time scores,  $b = -7.48$ ,  $p < .01$ , ( $RSq.Chg. = .122$ ,  $F(14,106) = 4.44$ ,  $p < .003$ ), and for composite certainty ratings,  $b = -6.14$ ,  $p < .05$ , ( $RSq.Chg. = .097$ ,  $F(14,107) = 3.38$ ,  $p < .008$ ). The regression coefficients for the three-way interactions indicated that the combined influence of A World at Peace, Equality, and Inner Harmony was such that greater ordinal distance for Health was associated with lower PHBS scores. This finding is informative about exploratory question 2. It suggests that certain patterns in the ranks for A World at Peace, Equality, and Inner Harmony, relative to Health, differentially influence PHBS scores. Main effects and interactions for the Hedonistic Pole and the Personal Pole



were nonsignificant.

A main effect for composite certainty rating scores was found for the Societal Pole which accounted for 6.7% of PHBS score variance,  $F(3,118) = 2.84$ ,  $p < .05$  (see Table 6). However, none of the individual regression coefficients was significant. Three-way interactions were found for standardized rank difference scores,  $b = -2.44$ ,  $p < .05$ , (RSq.Chg. = .043,  $F(7,114) = 5.81$ ,  $p < .007$ ), composite response time scores,  $b = -2.08$ ,  $p < .05$ , (RSq.Chg. = .034,  $F(7,113) = 4.44$ ,  $p < .02$ ) and for composite certainty ratings,  $b = -2.19$ ,  $p < .05$ , (RSq.Chg. = .035,  $F(7,114) = 4.72$ ,  $p < .04$ ). As evidenced by the negative regression coefficients, the combined influence of Peace, Freedom, and National Security, relative to Health, was associated with lower PHBS scores.

Analyses on the Safety Pole showed significant main effects for all four classes of predictors that accounted for nearly equal percentages of variance in PHBS scores (approximately 7%, see Table 6). Health had the only significant regression coefficient ( $b = -5.09$ ,  $p < .05$ ), but only for the analysis involving normalized ranks. Neither of the individual regression coefficients was significant.

Significant percentages of variance were accounted for on the Extraversion Pole by rank difference scores (5.7%),  $F(2,119) = 3.62$ ,  $p < .03$  and by the composite response time scores (5.4%),  $F(2,117) = 3.32$ ,  $p < .04$ .

The prediction of PHBS scores on the Satisfaction Pole resulted in no significant main effects or interactions.

The analysis of the Introversion Pole revealed significant main effects for all four classes of predictor (see Table 6). Significant regression coefficients were associated with Inner Harmony for each class of predictor. The standardized rank difference score regression coefficient for Health was not presented because the rank difference score for Health was zero.

Notice that the percentages of variance accounted for by the various analyses remained relatively low, less than 15%, suggesting that values were not particularly good predictors of PHBS scores. Some possible explanations for this observation will be discussed below.

The unstandardized regression coefficients presented in Table 7 show the relations of each of the individual values to PHBS scores. Notice that three of the normalized ranks (Peace, Equality, and Inner Harmony) comprising the Noble Pole were associated with negative regression coefficients. This indicates that as the value rank approached one, (greater importance), PHBS scores became larger. However, only the coefficient for Inner Harmony was significant and the coefficient associated with Beauty was positive. Similarly, two values on the Introversion Pole, Health and Inner Harmony, were associated with significant negative regression coefficients, whereas Salvation was associated with a nonsignificant positive coefficient. All coefficients for the Safety Pole were positive, contrary to the prediction, and only the

coefficient for Health was significant.

Three-way Interactions. The computational procedure for decomposing three-way interactions is described in detail in Jaccard et al. (1990). The purpose for decomposing an interaction is to isolate the influence of any given predictor variable on a criterion variable across the levels of the other predictor variables in the regression equation; that is, to determine the influence of any given predictor variable on the criterion variable as moderated by the other predictors. Of interest in the present study was how the relation between a specified value and PHBS scores changed as a function of the relative ranks of the other values in the interaction. Relative rank refers to the fact that rank difference scores represent the ordinal distance above or below Health that a specified value was located in an individual's value hierarchy.

The question that was asked by these analyses was whether there was a systematic relation among specified sets of value statements and PHBS scores. Kristiansen (1985c) reported that certain subsets of value statements were intercorrelated and formed independent bipolar dimensions with regard to PHBS scores. That is, one of the poles in each dimension was associated with higher PHBS scores and the opposite pole with lower PHBS scores. It should be noted that the subjects in Kristiansen's study, middle-aged Britons and Canadians, differed from the American college students in the present study which may, to some extent, account for the nonsignificant findings in

the present study.

The Hedonistic, Satisfaction, and Extraversion poles were expected to predict decreases in PHBS scores as the importance of values comprising those poles increased. This relation would have been evidenced by positive regression coefficients for normalized value ranks and by negative regression coefficients for standardized rank difference scores and the two composite scores. It was anticipated that the Noble, Safety, and Introversion poles would have shown the opposite relation, that is, greater importance for the values comprising these poles was expected to predict higher PHBS scores. This relation would have been evidenced by negative regression coefficients for standardized or normalized value ranks and by positive regression coefficients for rank difference scores and the two composite scores.

The top portion of Table 8 displays the intercept and unstandardized regression coefficients for the values comprising the main effects, two-way, and three-way interactions for the Noble Pole when analyses were conducted using standardized rank difference scores. The bottom portion of Table 8 presents the intercepts and unstandardized regression coefficients associated with the decomposition of the three-way (Inner Harmony x A World At Peace x Equality) interaction. The predicted PHBS scores represented by the intercepts and regression coefficients are displayed in Figure 3. These predicted scores

Table 8

Unstandardized regression coefficients associated with the three-way interaction for the noble pole using standardized rank difference scores as predictors of PHBS scores.

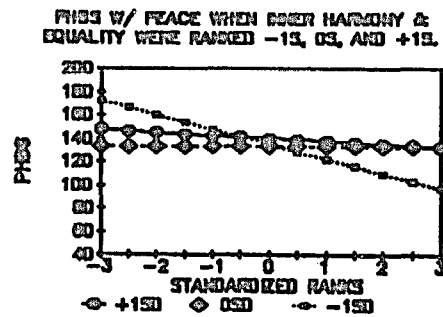
Value Name	Unstd. Reg. Coefficient
(P)eace	- .02
(B)eauty	-4.91
(E)quality	.46
(I)nnner harmony	5.84**
(P x B) two-way	5.72
(P x E) two-way	.28
(P x I) two-way	-1.01
(B x E) two-way	3.59
(B x I) two-way	-1.16
(E x I) two-way	2.14
(P x B x E) three-way	-1.15
(P x B x I) three-way	.02
(P x E x I) three-way	-7.51**
(B x E x I) three-way	2.24
Intercept	132.93

Intercepts and unstandardized regression coefficients associated with the decomposition of the significant three-way (P x E x I) interaction.

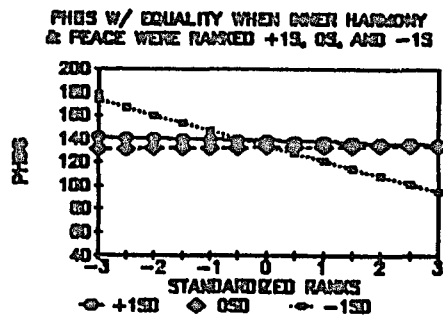
Standard Score	Value name	Intercept	Unstd. Reg. Coefficient
+1 sd	A World at Peace	140.01	- 2.54
0 sd	A World at Peace	132.93	- .02
-1 sd	A World at Peace	135.00	-12.51
+1 sd	Equality	138.50	- 1.03
0 sd	Equality	132.93	.46
-1 sd	Equality	134.46	-13.06
+1 sd	Inner Harmony	139.17	- 1.67
0 sd	Inner Harmony	132.93	5.84
-1 sd	Inner Harmony	145.88	- 1.63

Note. \*p<.05, one-tailed. \*\*p<.01, one-tailed.

3A.



3B.



3C.

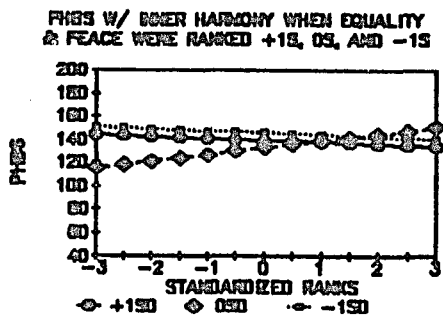


Figure 3. Decomposition of the 3-way interaction for the Noble pole showing the influence of each individual value on PHBS scores when the other two values were ranked +1, 0, -1 standard deviations from their respective means.

correspond to the influence that a selected value had on PHBS scores when the other two interacting values were ranked 1 standard deviation below their respective means (-1s), at their respective means (0s), or at 1 standard deviation above their respective means (+1s) relative to the rank of Health value.

Figure 3A shows that the influence of A World at Peace on PHBS scores was minimal when Equality and Inner Harmony were ranked at or above their respective means, relative to Health. However, when Equality and Inner Harmony were ranked below their respective means, relative to Health, the influence of A World at Peace on PHBS scores changed rather dramatically. Under these conditions, when A World at Peace was ranked one standard score above its mean, PHBS scores were low and when A World at Peace was ranked one standard score below its mean, PHBS scores were high. In other words, subjects who ranked A World at Peace among their more important values and who also ranked Equality and Inner Harmony among their less important values relative to Health, reported lower PHBS scores than when the reverse was true. A similar observation can be made for the value of Equality (see Figure 3B).

A different relation emerged for Inner Harmony (see Figure 3C). Subjects who ranked A World at Peace and Equality neither high nor low relative to Health were likely to report higher PHBS scores when they ranked Inner Harmony high than when they ranked Inner Harmony low. In view of the fact that Inner Harmony had the strongest zero-

order correlation with PHBS scores, it appears that Inner Harmony was also having the strongest moderating effect on other values in the interaction. That is, when Inner Harmony was ranked low relative to Health, and either of the other values was ranked high relative to Health, PHBS scores were low.

The top portion of Table 9 presents the unstandardized regression coefficients and intercept corresponding with the main effects, two-way, and the three-way interactions for the Societal Pole. The bottom portion of Table 9 displays the intercepts and unstandardized regression coefficients for the values after the three-way (National Security x A World At Peace x Freedom) interaction was decomposed at minus 1 standard deviation (-1s), the mean (0s), and plus 1 standard deviation (+1s). Figure 4 displays the PHBS scores predicted from those intercepts and unstandardized regression coefficients. Figure 4 shows that the PHBS scores predicted from National Security steadily decreased as the values of A World At Peace and Freedom declined relative to the value of Health.

Figure 4 shows the three-way interaction associated with the Societal pole. The influence of A World at Peace on PHBS scores (see Figure 4A) shows a pattern similar to that seen for the Noble pole. When the other two values were ranked low relative to Health, PHBS scores were higher when A World at Peace was also ranked below the mean relative to Health. Figure 4B shows that the value of



Table 9

Unstandardized regression coefficients associated with the three-way interaction for the societal pole using standardized rank difference scores as predictors of PHBS scores.

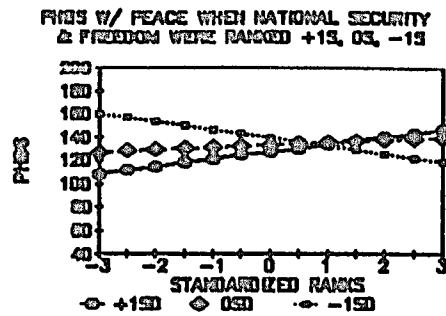
Value Name	Unstd. Reg. Coefficient
A World at (P)eace	2.18
(F)reedom	.38
(N)ational security	-6.42*
(P x F)	-2.01
(P x N)	-8.67**
(F x N)	- .16
(P x F x N)	-2.44*
Intercept	133.54

Intercepts and unstandardized regression coefficients associated with the decomposition of the significant three-way (PxFxN) interaction at -1 sd, 0 sd, and +1 sd.

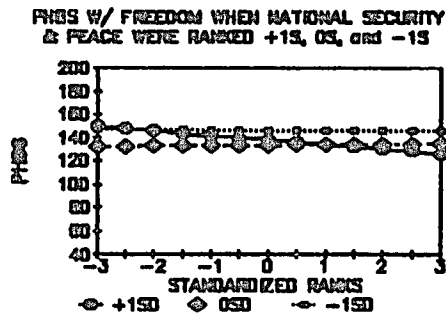
	Value name	Intercept	Unstd. Reg.
+1 sd	A World at Peace	127.65	6.39
0 sd	A World at Peace	133.54	2.18
-1 sd	A World at Peace	139.74	- 6.92
+1 sd	Freedom	137.97	- 3.92
0 sd	Freedom	133.54	.38
-1 sd	Freedom	146.45	- .21
+1 sd	National Security	134.08	- .04
0 sd	National Security	133.54	- 6.42
-1 sd	National Security	128.97	-17.69

Note. \*p<.05, one-tailed.

4A.



4B.



4C.

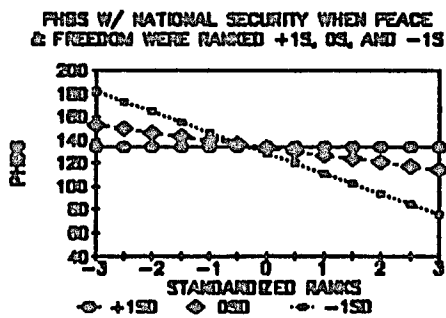


Figure 4. Decomposition of the 3-way interaction for the Societal pole showing the influence of each individual value on PHBS scores when the other two values were ranked +1, 0, -1 standard deviations from their respective means.

Freedom had very little influence on PHBS scores regardless of the relative ranks of either A World at Peace or National Security. Figure 4C shows the influence of National Security on PHBS scores. It can be seen that PHBS scores were highest when National Security was ranked low and A World at Peace and Freedom were also ranked low. PHBS scores were lowest when A World at Peace and Freedom were ranked low and National Security was ranked high.

Hypothesis 4. Pearson's coefficients from Table 5 and the results of the full-model regression analyses from Tables 6 and 7 were examined to assess the validity of composite scores. Although not directly related to Hypothesis 4, it can be seen in Table 5 that the number of significant coefficients for rank difference scores and the composite scores was larger than the number of significant coefficients for normalized ranks (i.e., 6 significant coefficients for normalized ranks compared with an average of 10.7 for the other three scores). Furthermore, in most cases the coefficients associated with either rank difference scores or composite scores were larger than those associated with normalized ranks. Exceptions can be seen for Inner Harmony,  $r(\text{NRNK}) = -.31$ , compared to  $r(\text{RDS}) = .13$ ,  $r(\text{RDRT}) = .13$ ,  $r(\text{RDCE}) = .14$ , and for the value Wisdom,  $r(\text{NRNK}) = -.18$ , compared to  $r(\text{RDS}) = -.01$ ,  $r(\text{RDRT}) = .02$ ,  $r(\text{RDCE}) = .01$ . It is highly unlikely, given the amount of variability in conventional ranks (see Table 1), that there are difference among these correlations.

Upon further examination of Table 5, it appears that

the composite response time (RDRT) and composite certainty rating (RDCE) scores did not enhance the relation with PHBS scores over that obtained from rank differences scores (RDS) alone. There are some minor fluctuations in the strengths of the correlations, for example, both composite scores for A World at Peace were significantly correlated with PHBS scores even though the rank difference score, itself, was not. However, the amount of change to the coefficient was negligible (RDS  $r = -.150$ , RDRT  $r = -.164$ , RDCE  $r = -.165$ ). The results of this analysis suggest that knowledge of decision time and degree of certainty regarding the relative importance of other values to Health, as represented by these composite scores, did not facilitate the prediction of PHBS scores. The similarities in the patterns of coefficients indicate that rank difference scores had a strong influence on the calculations of composite scores.

Contrary to the prediction made in hypothesis 4, Table 5 shows that correlations between rank difference scores and PHBS scores and between composite scores and PHBS scores were nearly identical. An examination of Table 6 shows that amounts of PHBS score variance explained by rank difference scores and the two composite scores were also nearly identical. Exceptions can be seen for the Introversion pole,  $Rsq(RDS) = .056$ , compared to  $Rsq(RDRT) = .139$  and  $Rsq(RDCE) = .144$ , and the Noble pole,  $Rsq(RDCE) = .097$  compared to  $Rsq(RDS) = .123$ , and  $Rsq(RDRT) = .122$ .

Again, it is highly unlikely that the multiple correlations were significantly different for either value pole.

Knowledge of response times and certainty judgments regarding the relative importance of Health did not improve the prediction of PHBS scores.

#### Exploratory Question 2

Composite scores did not correlate more strongly with PHBS scores than did rank difference scores alone.

Therefore, the question of whether some values competed more directly with Health than other values was addressed through analyses involving only normalized ranks (NRNK) and standardized rank difference scores (RDS). It can be seen in Table 5 that significant negative correlation coefficients were associated with standardized rank difference scores for the values of A Comfortable Life, Salvation, Freedom, An Exciting Life, Happiness, Pleasure, Mature Love, Social Recognition, National Security, True Friendship, and Family Security. The coefficients indicate that as ordinal distance from Health increased, PHBS scores became larger (i.e., larger negative rank difference scores were associated with larger positive PHBS scores). An examination of the coefficients associated with normalized ranks is helpful for discerning a pattern within the value statements. Notice that the significant negative coefficients were associated with personal types of values (Inner Harmony, Health, and Wisdom), whereas significant positive coefficients were associated with social types of values (National Security, True Friendship, and Family

Security). A reexamination of the values associated with significant rank difference score coefficients shows two broad categories of values, those related to comfort, happiness, pleasure and excitement, and values related to social relationships.

### Exploratory Question 3

Separate ANOVA's were conducted to compare Health as a predictor of PHBS scores with selected demographic variables. The one-way, analyses of variance for gender produced a significant main effect,  $F(1,120) = 36.51$ ,  $p < .000$ , with women (Mean = 143.15, SD = 16.04, Range = 106 to 171) reporting higher levels of preventive health behavior than men (Mean = 125.86, SD = 14.48, Range = 93 to 154). The strength of the effect of the IV in analysis of variance is expressed in eta squared, the proportion of variance in the DV that is attributable to the effect of the IV. In the analysis of gender Eta-sq = .233, indicating that 23.3% of the variance in PHBS scores was explained by knowledge of subjects' gender.

In order to determine whether females valued health more highly than men, a one-way ANOVA using Health value as the DV and gender as the IV showed that women did not rank Health (Mean = 4.81, SD = 3.91, Md = 3.5, Range = 1 to 17) higher than did men (Mean = 5.48, SD = 3.5, Md = 4.0, Range = 1 to 15),  $F(1,120) = .919$ ,  $p < .34$ . (Note: The F is based on normalized value ranks but the means and standard deviations for health value reported here were for

conventional ranks to facilitate interpretation.)

For the analysis of variance using current health status and Health value as IV's, neither current health status,  $F(3,111) = .12$ ,  $p < .95$ , nor Health value,  $F(2,111) = 2.19$ ,  $p < .12$ , explained a significant percentage of PHBS score variance. The interaction also was not significant,  $F(4,111) = .35$ ,  $p < .84$ .

Nonsignificant main effects were found for annual family income,  $F(1,116) = 1.12$ ,  $p < .29$ , and Health value,  $F(2,116) = 2.32$ ,  $p < .10$ . The annual family income x Health value interaction was also nonsignificant,  $F(2,116) = 1.24$ ,  $p < .29$ . An index of socioeconomic status (SES) was then computed in the manner of Straus (1980) and an analysis of variance was conducted to determine whether PHBS scores changed as a function of SES. The main effect for SES was nonsignificant,  $F(2,116) = .138$ ,  $p > .80$ .

For the ANOVA using smoking status and Health value neither smoking status,  $F(2,113) = 1.48$ ,  $p > .20$ , nor Health value,  $F(2,113) = 2.67$ ,  $p < .08$ , were significant factors. The interaction was also nonsignificant,  $F(4,113) = .79$ ,  $p < .55$ .

## CHAPTER FOUR

### Discussion

The present study investigated methodological, practical, and theoretical issues in the measurement of health value and its relation to preventive health behavior, which was operationalized as scores on Kristiansen's (1984b) Preventive Health Behavior Scale (PHBS).

#### Comparison of PHBS Means To Other Studies

The criticisms raised about the measurement of health value apply to measures of preventive health behavior, but to a lesser degree. Because several measures of preventive health behavior were reported in the literature (i.e., Seeman & Seeman, 1983; Langlie, 1977; Kristiansen, 1984b; Kristiansen, 1985a), total scale scores were not necessarily comparable from study to study. In most instances, meaningful comparisons could have only been made by considering individual items. Such fine-grained comparisons, however, would have had questionable utility because only a very limited number of items were common among the various studies. For this reason, only studies reporting total PHBS scores were addressed here. Studies that reported abbreviated PHBS scores (Kristiansen, 1985a), PHBS scores for smokers and nonsmokers (Kristiansen, 1985b), or which divided the PHBS scores into direct risk behavior and indirect risk behavior (Kristiansen, 1986)



were excluded.

The PHBS, upon visual inspection by the present author, had good face validity, that is, the scale items appeared to be assessing behaviors that promote good health. The scale also appeared to have good content validity, all items assessed health behaviors and not other behaviors that might or might not promote health. Given that many scale items were derived from other preventive health behavior scales (see, Kristiansen, 1984b), the convergent validity of the PHBS, the degree to which scores on Kristiansen's scale correspond with scores on other preventive health behavior scales, should also be reasonable.

In constructing the Preventive Health Behavior Scale, Kristiansen (1984b) drew items from previous studies of preventive health behavior (i.e., Langlie, 1977, 1979), from the British National Council on Alcoholism, and from studies of symptoms that prompt physicians to recommend medical consultation. The predictive or at least concurrent validity of the scale was assessed (Kristiansen, 1984b) by correlating scores on the PHBS obtained at time 1 with a measure of health status obtained 5 weeks later. The measure of health status consisted of a) the physical dimension of health in the form of a checklist of physical symptoms, b) a global psychological dimension of health in the form of a discrete rating of health status from poor to excellent, along with a graphic (100 mm line) rating of

health status, and c) the social dimension of health as assessed by number of days out of work and the number of days subjects had not felt well, from which age and socioeconomic status were partialled out.

PHBS scores were shown to be related to the physical dimension of health ( $r = .28$ ,  $p < .001$ ) but not to the psychological or social dimensions (Kristiansen, 1984b). The small correlation coefficient indicated that PHBS scores accounted for only 8% of the variance in health status. Cronbach (1990) advised that validity coefficients above .6 are unusual owing to continual changes in both people and situations.

Individual items on the PHBS have been shown to be sensitive to different environmental circumstances and to changes in environmental circumstances as evidenced by changes in the endorsement of the items over a 5-week period. For example, the item assessing the use of seat belts showed a rather dramatic shift in reported seat-belt use from time 1 (45%) compared to time 2 (90%), owing, at least in part, to the enactment of legislation during that period that made seat-belt use mandatory (Kristiansen, 1984b; Kristiansen, 1985d). Items assessing women's health issues (not included on the scale used in the present study) showed that frequency of breast examination and frequency of cervical smears were higher for Canadian than British women (Kristiansen & Harding, 1985). The differences in frequency of breast examination were believed to be related to public school health education

programs that were promoted to a greater degree in Canada than in Britian, and more Canadian women reported knowing how to do a breast exam than did British women. Canadian men and women, in general, reported better preventive health behavior than did British men and women which is possibly a testimony to Canadian health education policies.

Better criterion-related (empirical) validation would improve the PHBS. Criterion-related validation (Anastasi, 1982) refers, in this case, to a correlation between PHBS scores and other independent, direct measures of preventive health behavior. Deficient empirical validation does not appear to be unusual for scales that measure preventive health behavior. Empirical validation of this type of scale is not reported in Langlie (1977, 1979), Abella & Heslin (1984), or Miller, Thompson, & Holcomb (1988). One reason for the omission is that empirical validation for this category of behavior is both expensive and time-consuming, because it requires access to detailed information about lifestyle practices as well as access to individual's medical and dental records.

#### Relation Between Conventional Ranks and Forced-Choice Ranks

Earlier studies which examined the relations between the conventional ranking procedure and a rating scale procedure and between the conventional ranking procedure and a paired comparison procedure (Feather, 1973), or the conventional ranking procedure and a semantic differential procedure (Homant, 1969) reported coefficients similar to

those found in the present study. Recall, however, that earlier versions of the Rokeach Value Survey did not include an item for measuring health value; therefore, Feather's and Homant's studies did not specifically address the issue of whether health value is affected by measurement procedure. The comparability of the tau coefficient (.70) obtained in the present study with coefficients reported by other researchers, suggests that the inclusion of health value did not affect subjects' responding.

It should be noted that the forced-choice procedure in the present study was not the same as a paired-comparison procedure. In the latter, all possible paired combinations are used in the analysis. In the present study only the 6 top-ranked values were paired with every other value. The reason that a paired-comparison procedure was not used in the present study arose from concern that the more lengthy procedure would adversely affect subjects' responding owing to boredom and/or fatigue. Limiting the number of value pairs possibly had the effect of attenuating the tau coefficient, suggesting that the coefficient would have been larger if a paired-comparison procedure had been employed instead of a forced-choice procedure.

#### Relation Between Response Times and Certainty Ratings

The expected negative relation between response times and certainty ratings was shown idiographically by some subjects, whereas other subjects demonstrated a positive relation. The reason that the range of Pearson

coefficients (+.45 to -.67) was so wide is difficult to explain on a subject-by-subject basis. The procedures employed did not permit gathering individualized information about how subjects were responding to the value statements; therefore any attempt at explanation would be based upon speculation rather than empirical evidence. When examined nomothetically, a trend in expected direction was indicated by a marginally significant negative coefficient ( $r = -.10$ ).

On the basis of these analyses it would appear that response times and certainty ratings were unrelated for this sample. It must be remembered, however, that response times and certainty ratings were generated within a context of ordinal decisions regarding the relative importance of health compared to each of 18 other values. That is, subjects were being asked to decide, in units of time or in units of certainty, how important (i.e., difference in rank) health was compared to each of the other values.

An examination of the scatterplot of response times and certainty ratings (see Figure 2) showed that the relation between response times and certainty ratings is stronger than was suggested by the nomothetic analysis. Thompson and Dunn (1963) examined the relation between response times and certainty ratings on a timed visual discrimination task. Based on averaged response times and averaged certainty ratings, they obtained a significant negative coefficient of  $-.76$ . It must be recognized,

however, that making judgments about visual stimuli (Thompson & Dunn, 1963) or responding on a word recognition task, as in studies on perceptual defense (Brown, 1961), are very different tasks from making forced-choice judgments about the importance of value statements. Generalizing from such studies to the present study should be approached with caution. However, when the same approach was taken in the present study, that is, when the pairs of coefficients (see Table 3) were treated as scores, a highly significant negative coefficient ( $r(16) = -.71$ ,  $p < .001$ ) was obtained.

That significant coefficients in Table 3 were concentrated at the top and bottom of the distribution with fewer significant coefficients in the center gave the appearance of a U-shape, particularly among the certainty ratings. This pattern suggests that subjects were most certain about the ranks they assigned to their most important and least important values and least certain about those in the center. Among response times the pattern is less evident with a concentration of significant coefficients at the bottom of the distribution.

As was seen in Table 3, the bottom five pairs of coefficients for response times and those for certainty ratings had opposite signs indicating that short decision times were associated with high certainty for those values. These coefficients were associated with the values of Pleasure, Social Recognition, Salvation, A World of Beauty, and National Security. An explanation for this finding can

be found in the phenomenon of "fixation" (McGinnies & Bowles, 1949). Values that were unimportant were most salient and became accentuated in the decisions regarding the relative importance of other values. According to McGinnies and Bowles, the feeling of personal consistency engendered by being able to designate certain values as being relatively unimportant compared to other values is rewarding.

The lack of correspondence between response times and certainty ratings over the whole distribution was probably exacerbated by the large amount of variability in response times. It has been shown that as response time increases, unexplained variability in response time also increases (Luce, 1986; O'Brien, personal communication, October 4, 1989; Thompson & Dunn, 1963).

Other researchers (Temple & Geisinger, 1990) found a relation between statement length and response time. It was thought that statement length might account for some lack of correspondence between responses and certainty ratings, but the relation was not found in the present study. There are at least two reasons a correlation was not found. The first is that the coefficient was computed on averaged response times for each of the 18 values. This resulted in a statistical test that had very little power to detect the relation given that it did exist. Second, subjects were probably not reading the value statements in their entirety since the statements were repeated several

times during each session. It is likely that subjects were reading only enough of each statement to facilitate recognition which would serve to attenuate the correlation.

#### Predicting PHBS Scores

The validity of value ranks and rank difference scores is considered first, followed by the validity of the value poles as predictors of PHBS scores. It was established earlier that knowledge of response time and certainty ratings did not enhance the prediction of PHBS scores over that obtained by rank difference scores alone. For this reason the validity of composite scores was not discussed.

The validity of value ranks. Owing to the fact that a smaller numerical rank indicated greater self-reported importance for a given value and that larger numerical scores signified higher levels of self-reported preventive health behavior, a negative correlation between a given value statement and PHBS score indicated that greater importance for that value was associated with greater self-reported involvement in preventive health behavior. In the present study, Kendall's Tau coefficients (see Table 4) provided a conservative estimate of the relation between value ranks (RNK) and PHBS scores. This is because each pair of scores (value rank and PHBS score) was treated as ordinal data even though PHBS scores have the properties of an interval variable. Kendall's Tau coefficients were reported instead of Spearman's Rho because the value ranks and PHBS scores were not independent measures (Bruning & Kintz, 1987).



Kristiansen (1985c) reported, for a sample of middle-aged British men and women, that greater importance associated with the values of A World at Peace, and Health was related to higher PHBS scores, whereas greater importance associated with the values of An Exciting Life, Happiness, Mature Love, and Pleasure was related to lower PHBS scores. It was seen in Table 4 that Inner Harmony had the strongest facilitative relation with PHBS scores, followed respectively by Health, Wisdom, and Self-respect. True Friendship was also related to PHBS scores, but greater importance was associated lower PHBS scores. Only Health had a common relation with PHBS scores for the two studies.

In the present study, Pearson's coefficients for normalized ranks (NRNK) (see Table 5), showed that 6 values were significantly correlated with PHBS scores. Greater importance for 3 of the 6 values (Inner Harmony, Health, and Wisdom) was associated with higher PHBS scores. The 3 values associated with lower PHBS scores were Family Security, National Security, and True Friendship. Again, the only value that was significantly correlated with PHBS scores in both Kristiansen (1985c) and the present study was Health. This finding provided support for the convergent and predictive validities of Health value. Interestingly, Inner Harmony showed the strongest correlation with PHBS scores. Unlike Kristiansen's finding, A World at Peace was uncorrelated with PHBS

scores.

In the absence of qualitative information about how subjects were interpreting the Rokeach values, one can only speculate as to why certain values were correlated with PHBS scores, whereas others were not. The 3 values that were associated with higher PHBS scores were loosely defined as Inner Harmony: "freedom from inner conflict", Health: "mental and physical well-being", and Wisdom: "a mature understanding of life." Intuitively, there seems to be an pattern to the values. That is, engaging in preventive health behavior is a personal matter that may require a certain degree of preoccupation with self and sufficient maturity to understand the long-term implications of a healthy life-style.

The validity of rank difference scores. Analyses involving standardized rank difference scores expressed the association between values and PHBS scores relative to Health and were informative to both hypothesis 3 and exploratory question 2. The advantage conferred by standardized rank difference scores over normalized ranks appeared to be a greater sensitivity (larger coefficients) to values whose normalized ranks were associated with lower PHBS scores. For values whose normalized ranks were associated with higher PHBS scores, sensitivity was decreased as evidenced by smaller correlation coefficients. This differential sensitivity was seen in the pattern of coefficients in Tables 4 and 5. Additional evidence for the differential sensitivity of normalized ranks and

standardized rank difference scores was seen in the stepwise regression analyses. When normalized ranks were regressed on PHBS scores, only Inner Harmony and Health accounted for significant increments in explained variance. Values associated with lower PHBS scores were not detected. When rank difference scores were regressed on PHBS scores, Inner Harmony, Happiness, and National Security accounted for significant amounts of PHBS score variance. Owing to the fact that other researchers have not employed rank difference scores as extensively as in the present study, comparisons across studies were not possible.

Findings from stepwise analyses. Overall, the results of the stepwise regression analyses, employing either normalized ranks or standardized rank difference scores converged to some extent with findings reported by Kristiansen (1985c). In both studies, Health was related to higher PHBS scores and Happiness was related to lower PHBS scores. Kristiansen, however, reported that A World at Peace was related to higher PHBS scores, and that An Exciting Life, Mature Love, and Pleasure were related to lower PHBS scores. Significant regression coefficients were not found for these values in the present study using either normalized ranks or standardized rank difference scores. This was the case even though zero-order coefficients between rank difference scores and PHBS scores were significant for An Exciting Life, Mature Love, and Pleasure. Perhaps a more fruitful search for the influence

of values on PHBS scores should entail a narrower focus using a fewer number of values and employing both qualitative and quantitative methods.

The validity of the value poles. In general, Kristiansen's predictions regarding the value poles were not supported in the present study. Support for a given value pole would have been evidenced in regression coefficients that reflected the predicted relation with PHBS scores ascribed to that pole. In the case of the Noble, Safety, and Introversion poles, support for the expected facilitative relation between normalized ranks and PHBS scores would have been evidence by negative regression coefficients. For the Noble pole, coefficients for Inner Harmony, A World at Peace and Equality were negative, but only the regression coefficient for Inner Harmony was significant. A similar observation can be made for the Safety pole. Health, for that pole, was associated with the only significant regression coefficient and the only negative regression coefficient. Support for the Introversion pole was somewhat stronger in that both Inner Harmony and Health were associated with significant negative coefficients, whereas Salvation's coefficient was both nonsignificant and positive.

Given that Health was the second most important value for this sample, partial support for Kristiansen's predictions was found for standardized rank difference scores. The significant positive regression coefficient for Inner Harmony indicated that closer proximity to Health

was related to higher PHBS scores. In view of the findings for both normalized ranks and standardized rank difference scores, it appears that Kristiansen's predictions regarding the Introversion pole received the most support in the present study.

#### Competition Between Other Values and Health Value

To the extent that standardized rank difference scores capture the concept of competition between values, some of the findings in the present study were informative to the question of whether some values compete with Health and its relation to PHBS scores. At the most fundamental level, evidence for competition between values was seen in the zero-order correlations between the rank difference scores and PHBS scores. It was seen that A World of Beauty, A World at Peace, Freedom, Happiness, Pleasure, Mature Love, Social Recognition, National Security, True Friendship, and Family Security were significantly correlated with PHBS scores. The direction of the coefficients indicated that as the rank for each of these values approached the rank of Health, PHBS scores decreased. Further evidence for competition was seen in the results of regression analyses in which all standardized rank difference scores were entered simultaneously resulting in negative regression coefficients for Happiness and National Security.

The results of the decomposition of the three-way interactions were judged to be more informative about competition between values than about predictions of PHBS

scores from value poles. The interpretation of three-way interactions is, in principle, more difficult than the interpretation of main effects or two-way interactions. In the present study, difficulty of interpretation was complicated by lack of information about interval size between adjacent values. This information was lost owing to the ordinal nature of the data and to the failed attempts to estimate interval size through the assessment of response times and certainty ratings. Normalization of ordinal data alone does not restore information about interval size, it only converts a square distribution to equal intervals in the normal distribution. The data still contain only ordinal information and are, in principle, most appropriate for use with nonparametric statistics. The practice of converting conventional ranks to normalized ranks employed by other researchers (Feather, 1973, 1975; Kristiansen, 1984a, 1985a, 1985b, 1985c, 1986; Kristiansen & Eiser, 1986) was employed in the present study in an attempt to reproduce some of Kristiansen's findings using multiple regression techniques. The violation of the interval assumption suggests that cautious interpretation of these analyses is warranted.

The negative regression coefficients associated with the three-way interaction terms on the Noble pole ( $b = -7.51$ ) indicated that certain combinations of ranks, relative to Health, for A World at Peace, Equality, and Inner Harmony were associated with decreases in PHBS scores. It appeared that A World at Peace and Equality

tended to be associated with lower PHBS scores, but only when Inner Harmony was ranked one standard deviation below its mean, relative to Health.

For the Societal pole ( $b = -2.44$ ) it appeared that Freedom had little influence on PHBS scores regardless of the relative ranks of A World at Peace or National Security. A World at Peace tended to be related to higher PHBS scores when it was ranked closer to Health and when National Security was one standard deviation above its mean, but was related to lower PHBS scores if National Security was ranked low relative to Health. National Security, on the other hand was moderately related to lower PHBS scores when it was ranked closer to Health and the other two values were ranked at their means, relative to Health. A strong relation to lower PHBS scores was evident when National Security was ranked closer to Health and the other two values were ranked below their respective means, relative to Health.

On the basis of these analyses it appeared that the values of Happiness, A World at Peace, and National Security were likely to compete with the relation between Health value and PHBS scores for this sample. Inner Harmony, on the other hand, was likely to facilitate the relation between Health and PHBS scores.

In the absence of qualitative information about how subjects were actually interpreting the value statements, drawing conclusions is an exercise in disciplined

speculation. Given that Inner Harmony had the strongest correlation with higher PHBS scores (top of Table 5) and that National Security had the strongest correlation with lower PHBS scores (bottom of Table 5), it is of interest to note the characteristics of the five uppermost and five lowermost values that were represented in Table 5. Although Self-Respect and A Sense of Accomplishment (upper portion) and Mature Love and Social Recognition (lower portion) were not significantly correlated with PHBS scores, they did, nevertheless, have a foci similar to the adjacent significant coefficients. Comparing Inner Harmony, Health, Wisdom, Self-Respect, and A Sense of Accomplishment (uppermost values) with Mature Love, Social Recognition, National Security, True Friendship, and Family Security (lowermost values) suggests even more strongly that engaging in preventive health behavior, at least for college students, is a personal matter. The values concentrated in the lowermost regions of Table 5 reflect the importance of social relationships (Family Security and True Friendship). An individual who values social relationships and social obligations to a greater extent than private concerns, may be more likely to forego a regular exercise regimen or the alteration of his or her dietary habits, especially when those behaviors create tensions in his or her relationships with others.

#### Comparison of Health with Demographic Variables

The demographic variables, gender (male, female), current health status (poor, fair, good, excellent), annual



family income (low, high), socioeconomic status (low, medium, high), and smoking status (nonsmoker, exsmoker, smoker) were examined using analyses of variance to determine whether they explained significant amounts of PHBS score variance. It was found that women reported significantly higher PHBS scores than men, but women did not value Health more than men. None of the other demographic variables explained significant amounts of variance in PHBS scores. The analysis of variance using Health value (low, medium, high) was also nonsignificant. Using analysis of variance techniques it was found that Health value fared no better in terms of explaining PHBS score variance than did the majority of the demographic factors. It is likely that a different results would have been found if there had been more heterogeneity in age among the subjects. It would be interesting to compare college students against middle-aged persons on the same demographic factors.

#### Conclusions and Limitations of the Present Study

An attempt was made in the present study to develop a composite measure that embodied information pertaining to three aspects of behavior thought to characterize value judgments as they pertain to preventive health behavior. The theoretical structure underlying the composite scores was partially derived from two areas of research in social psychology: self-schema theory (Markus, 1977) and attitude-behavior consistency (Regan & Fazio, 1977). Taken

together the research provided a framework for understanding how values might influence the selection and organization of information and how they might influence the selection of health promoting behavior.

According to Markus (1977), self-schemas select, structure, and assign importance to information about self, and influence future behavior in schema-relevant domains. As such, self-schemas enable individuals to retrieve behavioral information readily from the memory for those domains they believe are very self-descriptive. Self-schemas facilitate making domain relevant judgments, and increase the confidence with which individuals predict their own schema-relevant behavior (Mills, 1983). When asked to make judgments about themselves, individuals do so faster in those domains that are very self-descriptive. In addition, self-schemas supply missing information about self (Payne, Connor, & Colletti, 1987) and allow individuals to make inferences about the likelihood that they will behave in a certain manner when only small amounts of information are available (Markus, 1977).

At the level of perception, self-schemas sensitize the perceptual processes (cf. Postman, Bruner & McGinnies, 1948) to respond more quickly on dimensions that are important, and when people are confident the opposite extreme is not true. People evidence a greater capacity for remembering schema-relevant information and such information tends to be more accessible and affect laden than information about other people (Fiske & Taylor, 1984).

Several of the findings of Fazio and colleagues lend support to research on self-schema theory. For example, Markus (1977), Markus et al. (1982), and Mills, 1983) reported that subjects who perceived themselves as schematic in a particular domain responded more quickly that schema relevant words and generated more behavioral evidence for the self-descriptiveness of those words than aschematic or nonschematic individuals. These findings converged with evidence provided by Fazio that direct behavioral experience facilitated attitude strength as a consequence of increased accessibility of attitudes from memory (Regan & Fazio, 1977; Fazio & Zanna, 1978; Fazio, Zanna & Cooper, 1978; Fazio, Chen, McDonel & Sherman, 1982). Other evidence suggested that attitudes formed through direct behavioral experience enhanced attitude-behavior consistency to a greater extent than attitudes formed through indirect experience (Fazio, Zanna & Cooper, 1978), and that such attitudes are held with greater confidence (Fazio & Zanna, 1978). Magnitude of attitude endorsement has also been shown to be associated with facilitation of attitude accessibility (Fazio & Williams, 1986). Extending these findings to values suggested that value accessibility should have been enhanced for individuals who behaved consistently with regard to a particular value domain and when a value was endorsed as extremely important.

Two theories pertaining to attitude research helped to

explain how the effects of direct behavioral experience might enhance value accessibility. Fazio, Zanna, and Cooper (1978) and Jones and Nisbett (1971) argued that actors possess more knowledge about their emotions and intentions than observers; consequently, information about self is processed differently from other types of information. Indirect experience, that is, being told about a value object or observing someone else's involvement with a value object, does not contain the same information as direct experience. Indirect experience is processed differently and produces values that are less accessible. A major difference between attitudes and values is that values organize experience at a more general level than attitudes. As a consequence, values may be more susceptible to activation by a broader range of stimuli than attitudes. The greater generality of values may help to explain why response times and certainty ratings did not facilitate prediction of PHBS scores. Subjects may have responded on the basis of what they believed were appropriate values to endorse, rather than values that actually guided their behavior. Bolt (1978) and Kristiansen (1984a) found that rankings for some of Rokeach's values were influenced by a socially desirability bias, whereas Kelly, Silverman, and Cochrane (1972) found no such influence.

The second explanation followed from Bem's (1967, 1972) self-perception theory. In the absence of behavioral experience with a value object, individuals may have had

difficulty assessing their values and feelings toward the object and as a consequence may have exhibited less value-behavior consistency (cf. Zanna, Olson & Fazio, 1981; Fazio et al., 1982; Fazio, Herr & Olney, 1984). This argument closely resembles Mills (1983) argument that self-schemas are formed when individuals observe regularities in their own behavior within specific domains of experience. The implication is that the strength of attitudes, self-schemas, and by inference, values, is enhanced to the extent that individuals have observed themselves behaving in characteristic ways with regard to specific stimulus situations.

The influence of values on the selection of health-promoting behavior may also arise from socialization processes. On the basis of socialization, some values may be more readily endorsed than others. When individuals are raised in rigidly structured social environments, the values imposed upon them may become so well-learned that responding in ways consistent with those values is essentially automatic. Numerous examples can be found in the social sciences, such as authoritarianism (Adorno, Frenkel-Brunswik, Levinson, & Sanford, 1950) or ingroup-outgroup bias (Sumner, 1906).

The issue of whether subjects who reported high PHBS scores were schematic with respect to certain values remains inconclusive. There are several reasons for the lack of findings with regard to value schema. First,

response time were extremely variable, such that the standard deviation for every value was at least half as large as its respective mean. There were no significant differences between mean response times for any pair of value statements. The excessive variability rendered the response times of little use with regard to establishing the relative importance of values. This is not to suggest that response times cannot provide useful information; rather, a refinement in the procedure for obtaining response times that is sensitive to individual interpretations of the Value Survey might reduce some of the variability. Excessive variability requires that effect sizes be substantial in order to discover differences, or that sample size is sufficiently large. Second, there was a notable ceiling effect for certainty ratings, such that certainty rating means were at least 7 on a scale from 1 to 10 for every value. The ceiling effect restricted the range of scores which possibly attenuated the correlations between certainty ratings and other measures.

Third, the issue of specificity of measurement that is an integral part of the theory of reasoned action (Ajzen & Fishbein, 1980) is relevant to the present study. According to Ajzen and Fishbein, the prediction of behavior from knowledge of an individual's attitudes is most accurate when attitudes and behavior are measured at the same level of specificity. As noted earlier, the Rokeach Value Survey was developed for assessing value systems at

the societal or institutional level, not for predicting specific types of behavior at the level of the individual. The PHBS, on the other hand, was developed to assess degree of involvement in preventive health behavior at the level of the individual. Because subjects were unaware of the purpose of the study at the time they responded to the value survey, there was probably quite a lot of more latitude in the generality of their responses to the value survey than there was to their responses to the PHBS. To the extent that the discrepancy was large, attenuation of the correlation between values and PHBS scores would be expected.

Fourth, the data were analyzed under the assumption that the relation between values and PHBS scores was linear. It is possible that the relation between values and PHBS scores was nonlinear which would attenuate the correlations. This might have been true particularly for composite scores which embodied information about decision times and certainty judgments. According to Glass and Hopkins (1970), nonlinearity is evidence by correlation ratios (eta-sq) that are larger than the squared multiple correlations (R-sq). An examination of the two strength-of-association measures, obtained through the SPSSx ANOVA procedure, did not reveal divergences from linearity for the value poles using rank difference scores and conventional ranks as factors. Analyses were not conducted for composite scores, however, owing to the overwhelming

influence of rank difference scores on composite scores it is unlikely that the pattern would have changed substantially.

Fifth, and probably least important, was the less than optimal reliability of the measures employed. Composite scores were based upon the rank difference scores, which were derived from conventional ranks on the Rokeach Value Survey. Reliability estimates for the Rokeach Value Survey were not exceptionally strong (.78), and neither were the internal consistency estimates of response times and certainty ratings. Furthermore, the reliability of the PHBS scale (.85) was less than optimal. In the present study, the presence of large amounts of variability in response times, the ceiling effect on certainty ratings, less than optimal reliability among predictors and criterion variables, and the large amount of variability for rank difference scores (see Table 2) all served to diminish the likelihood of finding significant correlations between composite scores and PHBS scores.

#### What was Learned?

The purpose of the present study was to investigate the validity of health value, as measured by the Rokeach Value Survey, as a predictor of preventive health behavior, where preventive health behavior is operationally defined as scores on the Preventive Health Behavior Scale (PHBS). Of particular interest was whether information embodied in composite scores would improve prediction of PHBS scores over that obtained from conventional ranks. The study was



not an attempt to identify the 'best' predictor(s) of PHBS scores. Analyses involving other predictors, i.e., demographic variables, were conducted merely to establish the validity of health value relative to other predictors.

One outcome from the present research was the development of a rudimentary method for measuring intervals of decision time and certainty between values on the Rokeach Value Survey. It is clear that refinements to the method for presenting value statements is necessary. Perhaps a more useful manner of presentation would employ statements that assess several exemplars of each value in the form of paired metaphors. Subjects could be asked to choose between metaphorical value statements that are paired for social desirability in a manner similar to that used for the Edward's Personal Preference Inventory. A subject's score on a particular value could be the proportion of statements chosen relative to the total number of possible choices. This might help to circumvent the problem of instability incurred when a single question is used to assess each value. Whether knowledge of decision time and certainty under these conditions would prove efficacious in the prediction of self-reported preventive health behavior is an open question.

A second outcome was evidence that rank difference scores, a measure of the relative importance among values, were sensitive to values that tended to be ranked low in the hierarchy, whereas conventional ranks were sensitive to

the more important values. It was also found that rank difference scores exerted a stronger influence on composite scores than did either response time or certainty ratings.

A third outcome was the identification of two general categories of values that were differentially associated with PHBS scores for this sample of college students. It appeared that students for whom the 'personal category' of values was most important, were also those more likely to report engaging in preventive health behavior than students who endorsed the 'social category' of values. Values that were relatively unassociated with PHBS scores included A Comfortable Life, Pleasure, Freedom, and A World at Peace. Perhaps part of the lack of association with PHBS scores arose from different interpretations of those values made by subjects endorsing each general category of values. For example, Pleasure might be defined by those endorsing 'personal values' as good feelings that arise from adopting a healthy life style, whereas Pleasure for those endorsing the 'social category' might entail laying around, watching television, and drinking beer with close friends.

A different interpretation of the two categories of values is the 'new age, self-focusing individuals' (personal) versus the 'traditional individuals' (social). The 'new agers' are those introspective, self-focusing individuals for whom a balanced personal life is most important. The traditional individuals are those who believe conforming to existing social norms is most important.

A fourth outcome was evidence that normalization of value ranks did not improve the prediction of PHBS scores over that obtained using conventional ranks. It was argued that normalization of ranks served only to convert a square distribution to equal intervals under the normal curve. This transformation does not replace information about interval size lost to ordinal measures. In spite of transformation, the researcher still has only the limited information inherent in ranked data.

When the task of research is to examine and make generalizations about the values of a society or a large organization (Rokeach & Ball-Rokeach, 1989), ordinal data are quite appropriate. However, when the research task is to predict specific behaviors of individuals or for small groups, ordinal data do not contain appropriate information, particularly ipsative instruments such as the Rokeach Value Survey. Parametric correlations among values are adversely influenced by the necessity that two values cannot occupy the same rank.

A fifth outcome was an awareness that both quantitative and qualitative methods of research are necessary when research instruments have a strong subjective component. Obtaining qualitative information through individual interviews is more laborious, but the advantages of such an approach should not be overlooked. Specific subjective information thus obtained could be analyzed for content, coded, and combined with the

conventional ordinal measure of values to make composite scores. This procedure might allow more accurate statistical control of unexplained variability in response times or certainty ratings arising from subjects' different interpretations of the value statements.

Overall, it appears that values in general and health value in particular, as measured by the Rokeach Value Survey and by composite scores, are not particularly good predictors of PHBS scores. Merely knowing that an individual ranks one value above another reveals very little about whether or not an the individual is likely to engage in preventive health behavior. This does not mean that research employing values should be abandoned if one's intent is to investigate the predictive validity of values. However, if one's intent is to predict preventive health behavior for applied purposes, then values are an unlikely candidate.

Variables which seem likely to be more useful in applied settings include: attitudes toward a specific health-promoting behavior; individual perceptions concerning quality of life; history of engaging in preventive health behavior; level of participation in health-promoting behavior among family and close friends; physical condition; accessibility and convenience of resources necessary for health-promotion; perceived credibility of health professionals; the amount of stress an individual is under; or method of dealing with stress.

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## APPENDICES

## Appendix A

### Breakdown of Demographic Characteristics By Frequencies and Percentages of College Student Sample (n = 122).

Demographic Characteristic	Freq.	%
<b>Gender</b>		
Men	48	39.3%
Women	74	60.7%
<b>Age</b>		
18-19yrs	72	59.0%
20-21yrs	38	31.2%
22-23yrs	9	7.3%
24-30yrs	3	2.5%
<b>Annual Family Income</b>		
\$10-\$19K	4	3.3%
\$20-\$29K	15	12.3%
\$30-\$39K	26	21.3%
\$40-\$49K	23	18.9%
\$50-\$59K	15	12.3%
\$60 +K	35	28.7%
Missing	4	3.3%
<b>Year in College</b>		
Freshman	63	51.6%
Sophomore	36	29.5%
Junior	8	6.6%
Senior	12	9.8%
Other	3	2.5%
<b>Academic Major</b>		
Business	26	21.3%
Engineering	16	13.1%
Health Studies	15	12.3%
Life Science	10	8.2%
Liberal Arts	55	45.0%

## Appendix A (Continued)

## Current Health Status

Poor	1	.8%
Fair	6	4.9%
Good	63	51.2%
Excellent	51	41.8%

## Religion

Catholic	61	50.0%
Jewish	8	6.6%
Protestant	32	26.2%
Other	6	4.9%
No Religion	15	12.3%

## Religious Participation

Active	39	32.0%
Inactive	81	66.4%

## Smoking Status

Heavy	0	0.0%
Moderate	4	3.3%
Light	5	4.1%
Occassional	28	22.9%
Ex-Smoker	7	5.7%
Never Smoked	78	63.9%

Parent's Education	Mother		Father	
	Freq.	%	Freq.	%
Some High School	2	1.6%	4	3.3%
High School Grad	26	21.3%	20	16.4%
Some College	30	24.6%	16	13.1%
College Degree	41	33.6%	38	31.1%
Some Graduate Work	11	9.0%	4	3.3%
Graduate Degree	8	6.6%	23	18.9%
Post Graduate Work	3	2.5%	16	13.1%
Missing	1	.8%	1	.8%

## Parent's Occupation

Home Maker	13	10.7%	1	.8%
Semi-Skilled	8	6.7%	5	4.1%
Skilled	9	7.4%	16	13.1%
Clerical	26	21.3%	4	3.3%
Proprietor	8	6.7%	19	15.6%
Professional	56	45.9%	72	59.0%
Don't Know	2	1.6%	5	4.1%



## APPENDIX B

This appendix contains the following materials that were used in the present investigation:

1. Demographics Questionnaire
2. Multidimensional Health Locus of Control Scale
3. Preventive Health Behavior Scale
4. Self-Monitoring Scale
5. Terminal Value Order and Certainty Rating Form
6. Consent Form
7. Instructions Provided to Subjects
8. Debriefing Sheet

## DEMOGRAPHICS QUESTIONNAIRE

Please answer the following questions to the best of your ability.

- 1) Sex:   \_\_\_ Male   \_\_\_ Female
- 2) Current age (round year to nearest 6 months):   \_\_\_
- 3) Year in college:   \_\_\_ Fr.   \_\_\_ So.   \_\_\_ Jr.   \_\_\_ Sr. Other\_\_\_
- 4) Which area of study best describes your current interest?
  - A) Business and Economics   B) Engineering and Physical Science
  - C) Health Studies           D) Life Science and Agriculture
  - E) Liberal Arts (Humanities, Social Science, Education)
- 5) What is your family's approximate annual income?  
(circle one)
  - A) \$5000 - \$ 9999   B) \$10000 - \$14999
  - C) \$15000 - \$19999   D) \$20000 - \$24999
  - E) \$25000 - \$29999   F) \$30000 - \$34999
  - G) \$35000 - \$39999   H) \$40000 - \$44999
  - I) \$45000 - \$49999   J) \$50000 - \$54999
  - K) \$55000 - \$59999   L) \$60000 or higher
- 6) What educational level have your parents attained?
 

MOTHER:	FATHER:
___ some high school	___ some high school
___ high school diploma	___ high school diploma
___ some college	___ some college
___ college degree	___ college degree
___ some graduate training	___ some graduate training
___ graduate degree	___ graduate degree
___ post graduate training	___ post graduate training

(Continued)

- 7) Please circle the category which best fits your MOTHER'S occupation.
- A - not employed outside the home
  - B - semi-skilled or unskilled worker (hospital aide, factory worker, etc.)
  - C - skilled worker or foreman (hair stylist, cook, etc.)
  - D - farmer (owner-operator or renter)
  - E - clerical or sales position
  - F - proprietor, except farm (i.e., owner of a business)
  - G - professional (teacher, architect, registered nurse, doctor, etc.) or managerial position (department head, store manager, etc.)
  - H - don't know
- 8) Please circle the category which best fits your FATHER'S occupation.
- A - not employed outside the home
  - B - semi-skilled or unskilled worker (truck driver, factory worker, etc.)
  - C - skilled worker or foreman (machinist, carpenter, etc.)
  - D - farmer (owner-operator or renter)
  - E - clerical or sales position
  - F - proprietor, except farm (i.e., owner of a business)
  - G - professional (teacher, architect, chemist, doctor, etc.) or managerial position (department head, store manager, etc.)
  - H - don't know
- 9) Please indicate your religious affiliation.
- ☐ Protestant    ☐ Catholic    ☐ Greek Orthodox    ☐ Jewish  
☐ Moslem        ☐ Buddhist    ☐ Other \_\_\_\_\_    ☐ None
- 10) Do you practice your religion regularly? (☐ Yes ☐ No)
- 11) How would you describe your current state of health?
- ☐ Excellent    ☐ Good    ☐ Fair    ☐ Poor  
☐ Chronically-ill    ☐ Handicapped
- 12) What is your current marital status?
- A) Single (never married)    B) Married    C) Separated
  - E) Divorced                    D) Widowed
- 13) How tall are you (ft. & in.)? \_\_\_\_\_
- 14) How much do you weigh? \_\_\_\_\_

(Continued)

15) What type of smoker would you describe yourself as?

- A) Heavy (more than 20 cigarettes per day)
- B) Moderate (less than 20 cigarettes per day)
- C) Light (a few cigarettes a day)
- D) Occasional (smoke socially at parties)
- E) Ex-smoker (previously a \_\_\_ smoker (see 1-4 above)
- F) Never smoked

16) Listed below are some physical symptoms you may or may not experience. Please use the scale below to indicate how often you have experienced each of the symptoms within the past month.

- |                  |                  |
|------------------|------------------|
| 1 - Never        | 4 - Often        |
| 2 - Almost never | 5 - Regularly    |
| 3 - Occasionally | 6 - All the time |

- |                                                    |                                                     |
|----------------------------------------------------|-----------------------------------------------------|
| <input type="checkbox"/> aches or pains            | <input type="checkbox"/> heart trouble              |
| <input type="checkbox"/> allergies or asthma       | <input type="checkbox"/> high or low blood pressure |
| <input type="checkbox"/> back aches                | <input type="checkbox"/> hot or cold flashes        |
| <input type="checkbox"/> bowel or urinary problems | <input type="checkbox"/> nausea                     |
| <input type="checkbox"/> chest pains               | <input type="checkbox"/> nervousness                |
| <input type="checkbox"/> difficulty breathing      | <input type="checkbox"/> numbness, anywhere         |
| <input type="checkbox"/> difficulty sleeping       | <input type="checkbox"/> paralysis                  |
| <input type="checkbox"/> difficulty swallowing     | <input type="checkbox"/> poor or excessive appetite |
| <input type="checkbox"/> dizziness                 | <input type="checkbox"/> problems with teeth        |
| <input type="checkbox"/> elevated cholesterol      | <input type="checkbox"/> seizures                   |
| <input type="checkbox"/> excessive perspiration    | <input type="checkbox"/> shakiness                  |
| <input type="checkbox"/> fainting spells           | <input type="checkbox"/> skin trouble               |
| <input type="checkbox"/> feeling tired or weak     | <input type="checkbox"/> twitching muscles          |
| <input type="checkbox"/> gastrointestinal trouble  | <input type="checkbox"/> weight control problems    |
| <input type="checkbox"/> headache                  | <input type="checkbox"/> vision or eye problems     |

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Appendix B  
MHLC Scale, 128-129  
PHBS Scale, 130-134  
Self-Monitoring Scale, 135-136

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# TERMINAL VALUE ORDER AND CERTAINTY RATING FORM

Please notice the location of the value that you chose in the list you made below. Now consider each of the values that you ranked above it and decide how certain you are that each of those values is more important to you than the value you chose. (Refer to the key below and write the number that best describes how certain you are on the appropriate line in the column titled "CERTAINTY RATING"). Next, consider each of the values you ranked below the value you chose and decide how certain you are that each of those values is less important than the one you chose. When you are through you will have made a certainty judgment for each of the values in the list below. Thank you again for your time and effort.

Very  
Uncertain 0--10--20--30--40--50--60--70--80--90--100 Very  
Certain

VALUE RANK	VALUE NAME (Capital letters)	CERTAINTY RATING
# 1		
# 2		
# 3		
# 4		
# 5		
# 6		
# 7		
# 8		
# 9		
#10		
#11		
#12		
#13		
#14		
#15		
#16		
#17		
#18		
#19		

## CONSENT FORM

In this experiment, we are attempting to understand something about human values. We anticipate that your participation will provide you with some sense of a methodology for studying human values. We will be happy to answer any questions that you may have about the research. The results obtained from studies such as this contribute to our understanding of human values, and therefore, to the theory of human values.

During the experiment, we will ask you to choose one value statement from a pair of value statements, to rank order some value statements, and to answer some questionnaires. We expect that your participation will require between 45 minutes and an hour.

The study involves no discomfort or risk to you. If for any reason, you wish to leave the study at any time, you have the right to do so without penalty. If you understand this form, please sign below.

\_\_\_\_\_ I agree to participate in this study.

\_\_\_\_\_ I do not agree to participate in this study.

Signature: \_\_\_\_\_ Date: \_\_\_\_/\_\_\_\_/\_\_\_\_

## VALUE RANKING TASK

## GENERAL INSTRUCTIONS

These instructions will explain what I would like you to do with the set of value cards accompanying the packet of questionnaires that you have just received. The cards are currently in alphabetical order as you may have noticed. I want to assure you that there are no "right" or "wrong" answers to this task.

Presented on these cards are 19 terminal values (ultimate goals). The first part of your task is to arrange the terminal values in the order of their importance to YOU, as guiding principles in YOUR life. To help you decide how important each terminal value is to you, insert each value into the following sentence:

"I believe that (insert value here) as an endstate of existence (ultimate goal of my life) is personally and socially worth striving for."

Study the cards carefully and select the one value that is the most important to YOU, then select the value that is second in importance, and so on until you have gone through all the cards. Arrange the cards in the numbered slots of the holder so the value you selected as most important occupies the slot numbered "1", the next most important value occupies the slot numbered "2", and so on until the value you selected as least important occupies the slot numbered "19". If you change your mind, feel free to rearrange the cards until you are satisfied that they truly represent how you feel.

Work slowly and think carefully. Remember, if you change your mind, feel free to change the order of the values. The end result should represent how you really feel. Again, be assured that there are no "right" or "wrong" answers.

Thank you for your time and effort.



## ADDITIONAL INSTRUCTIONS

You may have been aware while you were arranging the value cards that it was sometimes difficult to decide which values were more important than others. This is something nearly everyone experiences.

Before moving on to the next portion of this study I would like you to study your arrangement of the cards carefully and decide whether you would like to make any changes in the order. Please feel free to make any changes to the order that you wish.

When you feel certain that the value cards are arranged in the order of their importance to you, please turn to the sheet entitled "TERMINAL VALUE ORDER". In the column labeled "VALUE NAME", please print the names (appearing in capital letters on the cards) of the values in the order you ranked them. If you feel the need to change the order of the value cards, please feel free to do so, just be sure that you record the changes on the "TERMINAL VALUE ORDER" sheet. If you don't make any changes to the order of the values just go on to the next part of the study.

For the next part of the study you will be asked to randomly choose one value card from a set of cards, identical to the ones you arranged earlier, that are scattered face down on a table. After you have chosen one value card, please turn back to the sheet entitled "TERMINAL VALUE ORDER". The instructions will ask you to make a series of judgments about how certain you are that the value you chose is less important than each of the values ranked above it, and more important than each of the values ranked below it. Let me explain in more detail how I would like you to make these judgments. First, notice the rank position you assigned to the value you picked up from the table. This value is your point of reference for making the judgments. Some of the other values are probably ranked higher and some are probably ranked lower than the value you chose. Start by considering each of the values that you ranked above the one you chose. How certain are you that each of those values is more important to you than the value you chose from the table? (Notice that a key is provided on the sheet for you to refer to). After you have made a judgment about each of the values that is above the one you chose, please go on to consider the values you ranked below the one you chose. How certain are you that each of those values is less important than the one you picked up from the table? When you are through you will have compared the value that you chose with each of the other values and you will have assigned a certainty rating

to each of those values. (Of course you won't be able to compare the value you chose with itself, so you should just leave that certainty rating blank).

Work slowly and think carefully. If you change your mind, feel free to change your ratings. The end result should truly represent how you feel. As before, there are no "right" or "wrong" answers. If you have questions at any time, please feel free to ask the experimenter. Again, thank you for your time and effort

## DEBRIEFING

Thank you for being a participant in this study on human values. This study is designed to examine how the value placed on health affects degree of involvement in preventive health behavior. By their nature human values operate as a system, which means that people have a hierarchy of interacting values, some values being extremely important and some being less so. Therefore, in order to understand the relation between health value and preventive health behavior, health value must be examined within the context of an individual's system of values.

What is of primary interest in this investigation is the extent to which conflict between health value and other similarly important values affects the extent to which individuals engage in preventive health behavior. For example, it may be the case that when the value of worldly comforts and the value of health are both highly important that people will experience conflict surrounding things like restricting calories, getting sufficient exercise, or cutting down on tobacco or alcohol consumption.

The degree of conflict between values was assessed in two ways: a) By presenting pairs of values on a computer terminal I was able to measure the time it took for you to decide which of the pair of values was most important to you. Longer decision times have been shown to be associated with complexity of thinking during the resolution of conflict. b) The second measure of value conflict involved having you rate how certain you were that health was more or less important than each the other 18 values. Obtaining your certainty ratings required a deceptive manipulation to keep you from guessing the purpose of the study. I shall explain. Recall that you selected one value card from among nineteen others arranged upside down on a table. In order to make sure that you would compare "health" to each of the other values I had to be sure that you would select the "health" card; therefore all of the cards read "HEALTH: Mental and Physical Well-being". High certainty that "health" is more important than another value implies little conflict; whereas low certainty suggests that the decision was more difficult (greater conflict). Together I obtained two measures of conflict between health and each of the eighteen other values which should provide a greater degree of accuracy simply because I have a sampling of two types of your behavior rather than just one.

In addition to measuring your a) rank ordering of the values, b) decision time, c) certainty ratings, and d) preventive health behavior, I obtained measures of e) the degree to which you perceive that you have control over

your health, f) the degree to which you use your own feelings instead of cues from situations to guide your behavior, and g) several pieces of demographic information (gender, socioeconomic status, smoking status, etc.). These latter measures were taken because sometimes these variables influence how consistently people use their values to guide their behavior.

To the extent that health value influences the likelihood that people will engage in preventive health behavior, this study will provide greater insight into the kinds of value conflict that people experience around the issue of preventing health problems.

One last thing, please do not talk about this study to other students or show them any information about it because they may be a participant at some future time. When people are aware of the purpose of a study they often behave in ways that they think the investigator wants them to and not as they would ordinarily (the "good" subject bias or "experimenter expectancy effect"). Although there is nothing secretive about this study, the measurement of human values is sensitive to these kinds of biases. This is the first time anyone has measured health value this precisely, so you and I are sort of "pioneering" a new area of research.

Thank you for your understanding and cooperation. If you have questions about this study or your involvement in it you may phone me (Bob Blodgett) at 862-4047 or drop by 103 Wolff House. I will be happy to discuss it with you. Thanks again.

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**Appendix C, Revisions to Preventive Health  
Behavior Scale (PHBS), 144-147**

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## Appendix D

### Procedure used in the decomposition of three-way interactions.

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Decomposition of the three-way interactions for the Noble and Societal poles was executed using the following procedure. (Note. the procedure outlined below describes the process by which the influence of a single value in an interaction was assessed. This procedure was repeated for each of the other values in the interaction):

Step 1. Regression coefficients and intercepts were obtained using the SPSSX Regression Procedure in which main effects were entered, followed by two-way multiplicative interaction terms, followed in turn by three-way multiplicative terms. This yielded the regression coefficients and Y-intercept necessary for decomposing the interaction effects.

Below are the unstandardized regression coefficients and the intercept, from Table 8, obtained when Peace, Beauty, Equality, and Inner Harmony were regressed on PHBS scores.

(P)eace	b1	- .02
(B)eauty	b2	-4.911
(E)quality	b3	.461
(I)nnner harmony	b4	5.839**
(Px)B two-way	b5	5.717
(Px)E two-way	b6	.282
(Px)I two-way	b7	-1.011
(Bx)E two-way	b8	3.593
(Bx)I two-way	b9	-1.159
(Ex)I two-way	b10	2.137
(Px)Bx)E three-way	b11	-1.151
(Px)Bx)I three-way	b12	.022
(Px)Ex)I three-way	b13	-7.505**
(Bx)Ex)I three-way	b14	2.244
Intercept	A	132.934

Step 2. Specification of a value of interest whose influence on PHBS scores was to be assessed. The other two values were treated as moderators of the value of interest.

Step 3. All terms in the regression equation containing the value of interest were collected on one side of the equation and were used in the computation of the regression coefficient.

## Appendix D (continued)

Step 4. All terms in the regression equation that did not contain the value of interest were used in the computation of the Y-intercept.

The regression equation for the values comprising the three-way interaction on the Noble pole was of the following form:

$$Y\text{-hat} = A + b1(P) + b2(B) + b3(E) + b4(I) + b5(PxB) + b6(PxE) + b7(PxI) + b8(BxE) + b9(BxI) + b10(ExI) + b11(PxBxE) + b12(PxExI) + b13(PxExI) + b14(BxExI)$$

Step 5. A range of standard scores was specified for the moderating values, across which the influence of the moderators on the value of interest was assessed (e.g., -1 s.d., 0, +1 s.d.).

Step 6. Each standard score was then substituted into the regression equation (see example below) and new regression coefficients and intercepts were computed across the range of standard scores for the moderating values.

$$\begin{aligned} b(\text{Peace}) &= b1 + b5(B) + b6(E) + b7(I) + b13(ExI) \\ &= -.02 + 5.717(1) + .282(1) + -1.011(1) + \\ &\quad -7.505(1)(1) \\ &= -2.537 = \text{The coefficient for (P)eace when} \\ &\quad \text{(B)eauty, (E)quality, and Inner Harmony} \\ &\quad \text{were ranked +1 s.d. above their respective} \\ &\quad \text{means relative to Health.} \end{aligned}$$

$$\begin{aligned} A(\text{Peace}) &= A + b2(B) + b3(E) + b4(I) + b8(BxE) + b9(BxI) + \\ &\quad b10(ExI) + b11(PxBxE) + b12(PxExI) + b14(BxExI) \\ &= 132.934 + -4.911(1) + .461(1) + 5.839(1) + \\ &\quad 3.593(1)(1) + -1.159(1)(1) + 2.137(1)(1) + \\ &\quad -1.151(1)(1)(1) + .022(1)(1)(1) + \\ &\quad 2.244(1)(1)(1) \\ &= 140.009 = \text{The intercept for (P)eace when} \\ &\quad \text{(B)eauty, (E)quality, and Inner Harmony} \\ &\quad \text{were ranked +1 s.d. above their} \\ &\quad \text{respective means relative to Health.} \end{aligned}$$

Step 7. A second range of standard scores was then specified for the value of interest (e.g., -3 s.d., -2 s.d., -1 s.d., 0, +1 s.d., +2 s.d., +3 s.d.).

Step 8. Using the new regression coefficients and intercepts, predicted PHBS scores were calculated using the standard equation for a straight line ( $Y' = A + bX$ ).

Step 9. Predicted PHBS scores across different ranks of the moderating values were plotted.